Fetal Monitoring

INSTRUCTIONS FOR USE

FM-2 Antepartum Fetal Monitor (M2922A)

FOR USE WITH FM-2 FETAL MONITOR

PHILIPS

Printed in Germany 10/04

Part Number M2922-9001C
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Philips

M2922A

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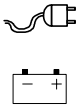
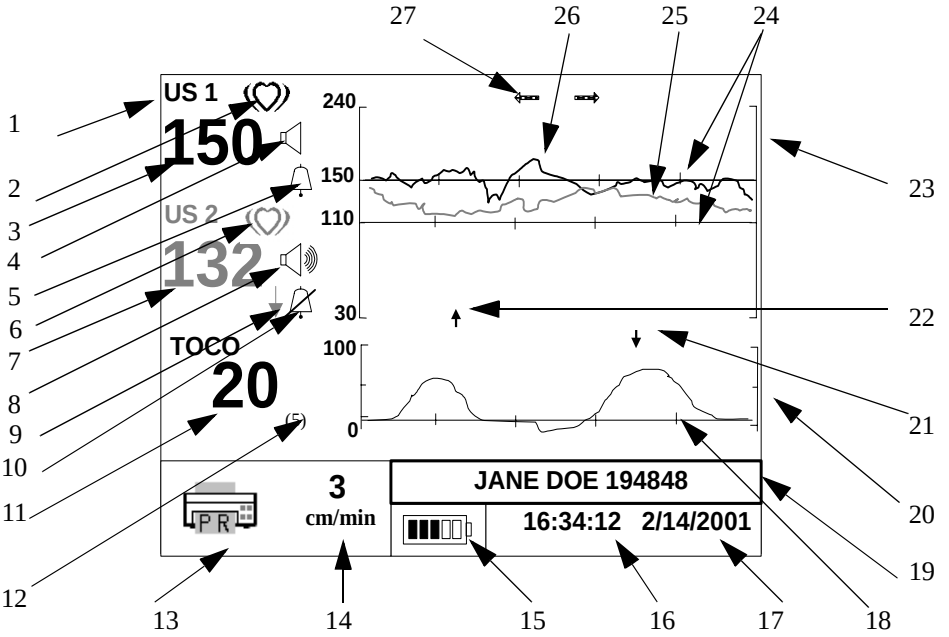
1
Quick Reference

This chapter is a quick reference only.You must familiarize yourself with the safety information in Chapter 2 in order to use the monitor safely.

What is this?		Use this...	Comments
1 on/off		... to switch the monitor on and off.	The monitor plays a jingle and displays a startup screen whilst performing a power-on self test.
2 power source		...as an indicator of the power source.	Indicates whether monitor is powered from AC power source via the power supply or battery only. Recharge the battery after use. It is recommended to keep it charged. Unlike a nickel-cadmium battery, lead acid batteries do not suffer from the “memory” effect so there is no need to discharge it completely before recharging.,

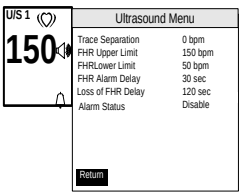
What is this?		Use this...	Comments
3 volume/ alarm silence		...to silence an alarm or set volume on an ultrasound channel.	If an alarm is sounding, press this button to silence it. If no alarm is sounding, press this once to select ultrasound channel 1, or twice for ultrasound channel 2 (if present). Then rotate the wheel to adjust the alarm volume of the selected channel. Press it again to exit the adjustment mode. You can still change the volume on an ultrasound channel even if an alarm condition is present.
4 contrast adjust		...to enter/exit contrast adjust mode.	Press once to enter adjust mode and automatically reset the contrast to the factory default level. Rotate the wheel to alter the contrast. Press a second time to exit the mode.
5 Toco zero		...to zero the Toco data to the baseline.	New Toco data is shifted to the preset baseline after you press this. Zero the baseline before you commence monitoring
6 clinician marker		...to annotate the trace with the clinician event marker.	Press once to make one annotation on patient trend data. Multiple presses marks the trace multiple times.
7 trend scroll		...to enter/exit trend scroll mode.	Press once to enter trend scroll mode. Rotate the knob to slide the trend data across the screen. Press a second time to exit the mode.
8 grid line enable		...to enter/exit grid mode.	Use during an NST to more easily determine duration and frequency of FHR accelerations above 15 BPM. Press once to set lines 15 BPM apart. Rotate navigation wheel to adjust the position of the paired lines. Press a second time to return to the previous monitoring mode.
9 navigation wheel		...to navigate around the screen.	Turn the wheel to highlight an item. Press the wheel to select your choice. Use this to select frames, which allow you access to that frame's associate menu. When in a menu, turn the wheel to cycle through items, values etc. Press the wheel to select the item or value. Full instructions on how to use navigation wheel to change settings and alarms are given on page 25.

Monitoring Screen Display



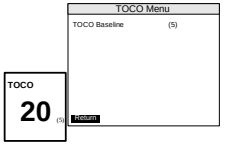
1. Ultrasound channel indicator
2. Heart rate icon for Fetal Heart Rate 1
3. FHR 1 on US1 (in **FHR numeric frame**)
4. FHR1 amplitude volume indicator (off)
5. Alarm status indicator for FHR1 (alarm on)
6. Heart rate icon for FHR2
7. Fetal Heart Rate 2 on US2
8. FHR2 amplitude volume indicator (high)
9. Trace offset separation “on” indicator
10. Alarm status indicator for FHR2 (off)
11. Toco value (in **Toco numeric frame)**
12. Present Toco baseline value
13. **Communications frame** (recorder attached)
14. Paper speed (3 cm/min)
15. **Power status frame** (running from battery)
16. Time and....
17. .....Date (in **Time/Date frame**)
18. Toco baseline reference
19. **Patient ID frame**
20. **Toco Trend frame**
21. Clinician marker
22. Patient marker
23. **Heartrate trend frame**
24. Ultrasound grid lines (normocardia)
25. Ultrasound trend for FHR2 (lighter trace)
26. Ultrasound trend for FHR1 (darker trace)
27. Trend scroll indicator (active)

Ultrasound Monitoring



1. Connect US transducer (red connector) to upper US red socket.
2. Go to Ultrasound menu, and check alarms. Adjust if necessary.
3. Adjust US speaker volume (press speaker key and turn wheel).
4. Fasten belt around patient.
5. Find fetal heart position.
6. Apply US gel to transducer and apply transducer to patient.
7. Fasten transducer in position on belt when you get a good signal.
8. Verify this is FHR.
9. Start monitoring.
10. Periodically compare mother's pulse with FHR signal to ensure you monitor FHR, not maternal heart rate.
11. Switch off when finished. Always switch off between patients.

Toco Monitoring



1. Connect Toco transducer (brown connector) to brown Toco socket.
2. Position transducer on fundus and obtain good signal.
3. Fasten belt and clip transducer to it. Check belt tension.
4. Go to Toco menu and check baseline value. Adjust if necessary.
5. Zero baseline once, between contractions.
6. Start monitoring.
7. Switch off when finished. Always switch off between patients.

Non-Stress Test (NST) Aid

1. Press the grid line key on the front of the monitor.
2. Turn wheel to position the 15 bpm apart grid lines on FHR to help you determine frequency and duration of accelerations.

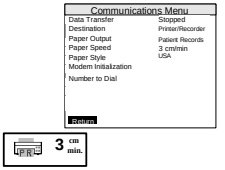
Event Markers

1. Press the clinician marker on the front of the monitor to mark the trace or
2. Patient presses button on remote marker cable to mark trace when she perceives fetal movement.

Viewing Stored Fetal Traces on Screen

1. Press the trend scroll key on the front of the monitor.
2. Turn the navigation wheel to scroll through stored traces).

Printing and Transmitting



1. Turn navigation wheel to highlight Communications Frame.
2. Press the wheel to activate the frame and view menu options.
3. Turn the wheel then press it to select each menu option in order.

How do I...	...this is how
...print stored fetal traces to a printer or the recorder? Connect the monitor *directly* to the printer using the 25-pin to 36 pin cable that belongs to the printer.	1. Paper output -> Patient records 2. Destination -> Printer/recorder 3. Data Transfer -> Start data transfer -> Yes 4. Select: – "yes" for trace of displayed ID – "no" to display ID of next trace – "all" to print all remaining stored traces.
...transfer stored fetal traces to FM-2 viewer utility software? Connect the monitor *directly* to the computer using the 9-pin cable M1380-61624 that comes with the software OR Connect the monitor to a *modem* using the 9-pin to 25 pin cable that came with the modem.	1. Destination -> FM-2 Viewer 2. Data Transfer -> Start data transfer -> Yes 3. Select: – "yes" for trace of displayed ID – "no" to display ID of next trace – "all" to print all remaining stored traces.
...print current fetal trace realtime to OB TraceVue? Connect the monitor *directly* to OB **TraceVue** using the 9-pin cable M1380-61624.	1. Destination -> System Online 2. Data Transfer -> Start data transfer -> Yes
...remotely transfer stored fetal traces to OB TraceVue Connect monitor to *modem* using the 9-pin to 25 pin cable that came with the modem.	1. Destination -> System Batch 2. Data Transfer -> Start data transfer -> Yes 3. Select: – "yes" for current record – "no" to display ID of next record – "all" to print all stored traces.
...print current fetal trace realtime to the recorder? Connect the monitor *directly* to the recorder using the 25-pin to 36-pin cable that belongs to the recorder.	1. Paper output -> Current record 2. Destination -> Printer/recorder 3. Data Transfer -> Start data transfer -> Yes
...print a summary list of stored trace IDs to a printer? Connect the monitor *directly* to the printer using the 25-pin to 36 pin cable that belongs to the printer.	1. Paper output -> Summary list 2. Destination -> Printer/recorder 3. Data Transfer -> Start data transfer -> Yes

2
Safety

Instructions for Safe Operation and Use of the FM-2 Monitor

Visually inspect the monitor and accessories periodically to ensure that the monitor, cables, line cords, transducers and instruments have no visible evidence of damage that may affect patient safety or monitoring performance. Do not use if there is any visible sign of damage.

Only the power supply supplied with the monitor is approved for use in supplying external power for operating and recharging the monitor's internal battery.

Only the supplied AC line cord, or its equivalent, is approved for use with the recorder.

Do not attempt to service the monitor or recorder. Only qualified service personnel should perform any needed internal servicing.

The monitor is not specified or intended for operation during the use of defibrillators or during defibrillator discharge.

The monitor is not specified or intended for use in the presence of electrosurgical equipment.

The monitor is not specified or intended for use in conjunction with any other type of monitoring equipment except the specific devices identified for use in this book.

Perform safety testing in accordance with local legal requirements to ensure proper patient safety.

Do not use the monitor if it fails its power-on self-test procedure.

Warnings

Warning

EXPLOSION HAZARD: Do not use the monitor in a flammable atmosphere where concentrations of flammable anesthetics or other materials may occur.

Warning

SHOCK HAZARD: The power receptacle must be a three-wire grounded outlet. Never adapt the three-prong plug from the power supply or accessory to fit a two-slot outlet. If the outlet has only two slots, make sure that it is replaced with a three-slot grounded outlet before attempting to operate the monitor.

Warning

Do not connect to an electrical outlet controlled by a wall switch.

Warning

SHOCK HAZARD: Do no attempt to connect or disconnect a power cord with wet hands. Make certain that your hands are clean and dry before touching a power cord.

Warning

Use only patient cables and transducers supplied with the monitor. Use of any other patient cables may result in out-of-specification performance and possible safety hazards.

Warning

Take care to position the monitor securely when overhead. Avoid insecure positioning.

Warning

If the monitor has been exposed to temperature ranges outside the specified operating range, allow it to return to the correct operating range before turning it on.

Warning

Service may be performed by qualified service personnel only. The monitor has no user serviceable parts.

Warning

Disconnect the printer or recorder from the AC power before connecting them to the monitor.

Cautions

Caution

US law restricts this device to sale by, or on the order of, a physician.

Caution

Keep the operating environment free of dust, vibrations, corrosive, or flammable materials, and extremes of temperature and humidity. Keep the unit clean and free of transducer gel and other substances.

Caution

When installing the unit into a cabinet, allow for adequate ventilation, accessibility for servicing, and room for adequate visualization and operation.

Caution

Do not operate the unit if it is damp or wet because of condensation or spills. Avoid using the equipment immediately after moving it from a cold environment into a warm, humid location.

Caution

Never use sharp or pointed objects to operate the front-panel switches.

Caution

General purpose personal computers, printers and modems are not designed to meet the electrical safety requirements of medical devices. Connect them with a cable of sufficient length to locate them outside of the patient vicinity. This means a minimum distance of 1.5 meters from the patient's bed or chair. Do not connect the FM-2 recorder to the monitor at the same time as a non-medical device (computer, printer or modem) if the recorder is located in the patient vicinity. For additional information refer to IEC/EN Standard 60601-1-1.

Caution

Do not autoclave or gas sterilize the monitor or any accessories. Follow cleaning and disinfection instructions. When washing the transducer belts, the water temperature must not exceed 60°C (140°F).

Caution

Do not use the transducer's ring clip to secure the belt around the patient - you must use a fixing button on the belt for this. Using the transducer clip to secure the belt may damage the transducer and does not keep the belt in place reliably.

Caution

Do not mistake demonstration data for genuine patient data.

3
Getting Started

FM-2 Fetal Monitor Intended Use

FM-2 is a Fetal Monitor for non-invasively measuring, and showing maternal uterine contractions and the fetal heart rate as a graphical display and optionally on a strip chart recorder, printer or OB TraceVue system. The data is intended to aid in assessing the well being of the fetus during the final trimester of pregnancy (Non-Stress Test). This device is for use only by trained medical personnel located in hospitals, clinics, doctors' offices and in the patient's home or during transport, under the direction of a licensed practitioner.

Check List

Familiarize yourself with the monitor and its components by reading this book. Use this check list to install, set up and configure your monitor.

Tasks	See Page	Done
Task 1: Check shipment	**15**	❑
Task 2: Attach power cables and switch on	**16**	❑
Task 3: Set the language	**18**	❑
Task 4: Set the time and date	**19**	❑
Task 5: Set the paper style and speed	**20**	❑
Task 6: Start monitoring	**37 and 47**	

Checking the Shipment

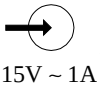
Use this table to check your delivery. Retain the original packaging material in case you need to return the monitor.

Monitor (M2922A)	Shipped
1 x Ultrasound Transducer (or two, if additional transducer ordered for twins) 2.5m cable	1
Ultrasound transmission Gel	1 bottle
Reusable Transducer Belts (M1562A) 1.3m long, 5cm wide, with button holes and pre-attached buttons. Can be further cut. Contains latex.	2 belts
Toco Transducer 2.5m cable	1
Remote Event Marker	1
Transducer knob adapters	1 pack
Pocket Guide to Fetal Monitoring and Assessment by Susan Martin Tucker, 4th edition, English language orders only ISBN: 0-323-00884-4	1
Instructions for Use and Service Guide	1
Power Supply and Power Cord (110 or 220V) 2 meter	1

Recorder (M2925A) (110V or 220V as appropriate)	Shipped
Power Cord 2 meter	1
PC parallel printer cable for connecting monitor to recorder.	1
Recorder Paper appropriate for country	1 pack

Setting Up Your Monitor the First Time

Connecting the Power Supply

One cable is permanently attached to the power supply. Connect this cable to the rear of the monitor, at the input marked 

. Insert the AC line cord into the three-pronged IEC receptacle on the power supply. Insert the other end into an appropriate wall outlet.

Warning

Do not connect to an electrical outlet controlled by a wall switch

Warning

SHOCK HAZARD: Do not attempt to connect or disconnect a power cord with wet hands. Make certain that your hands are clean and dry before touching a power cord.

Warning

SHOCK HAZARD: The power receptacle must be a three-wire grounded outlet. Never adapt the three-prong plug from the power supply or accessory to fit a two-slot outlet. If the outlet has only two slots, make sure that it is replaced with a three-slot grounded outlet before attempting to operate the monitor.

Using the Battery

To run from the monitor's internal battery, switch the monitor on, without the power supply connected. Recharge the battery using the power supply, either during monitoring or when the monitor is switched off.

Connecting the Remote Marker Cable

Insert the cable into the connector, marked , at the side of the monitor.

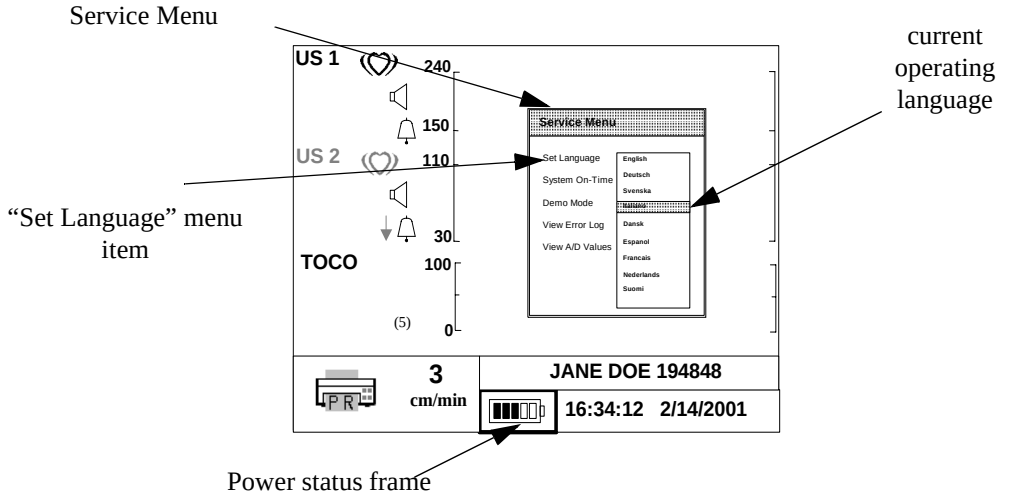
Mounting on Wall or Rollstand

Instructions for mounting your monitor come with the GCX mounting kit.

Choosing Your Language

The monitor is delivered with English as the default language. To choose a different language:

1. Switch on the monitor.
2. Rotate the navigation wheel[1] until the Power status frame is highlighted.
3. Push the wheel to display the Service Menu. The first item ("Set Language") shows the current operating language.
4. Select "Set Language" to see a second menu with all language choices.
5. Rotate the wheel to highlight your language.
6. Press the wheel to select it.



7. Turn the monitor off and switch on again to activate the new language.

Caution

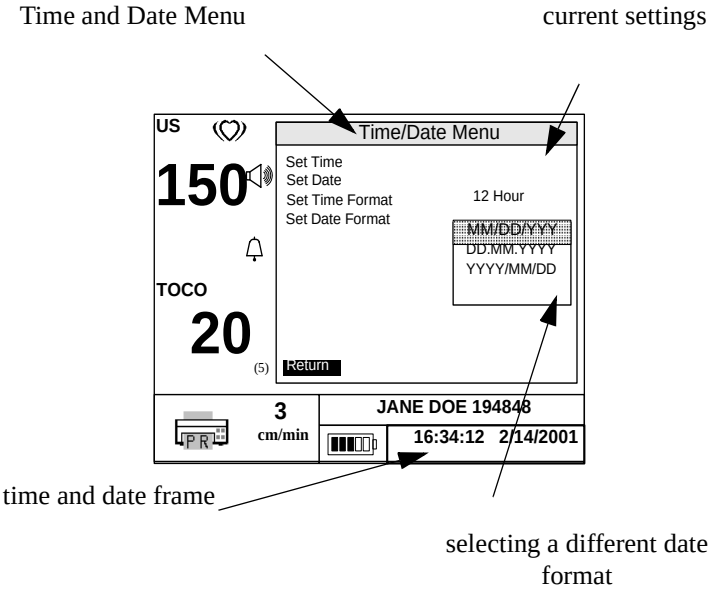
Selecting an unfamiliar language may make it difficult to resume normal operation.

1. See page 25 for full instructions about using the navigation wheel.

Setting the Time and Date

Use the Time and Date menu to set the current time and date, and their display formats. Remember to change the time when daylight saving time changes (unless realtime monitoring with an OB **TraceVue** system, when the system communicates the time and date change to the monitor).

1. Select the Time and Date frame.
2. Rotate and press the wheel to select the setting you want to change.
3. Rotate the wheel to change the values. Press the wheel to save the change.
4. Repeat until you have set the time, time format, date, and date format.



Changing the Time or Date During Monitoring

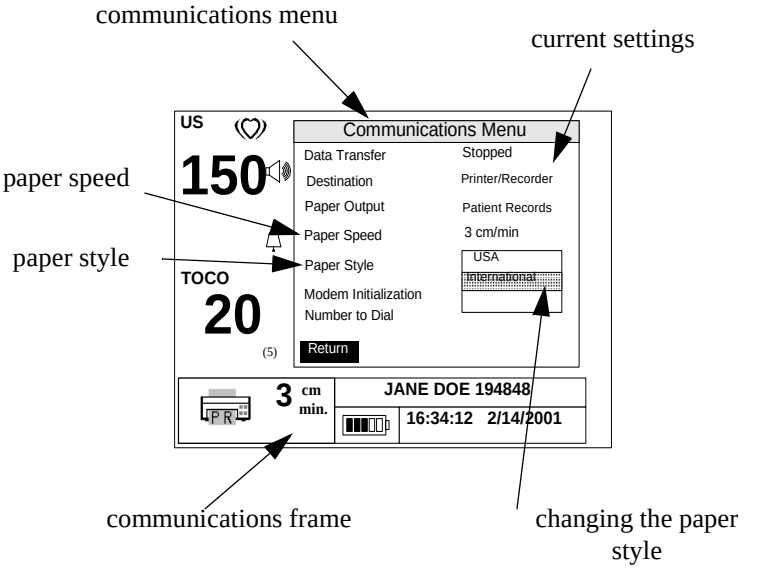
Always start a new monitoring session after changing the time or date. Although the new time is shown on the monitoring screen, it is not stored within the fetal trace record.

Setting the Paper Style and Speed

1. Select the Communications frame.
2. Select Paper Style.
3. Rotate the wheel to change the values (USA or International). Press the wheel to save the change.

- USA: Orange paper 30-240 FHR scale
- International: Green paper, 50-210 FHR scale

4. Using the same technique, now set the paper speed (1, 2 or 3 cm/min).



4
General Information

This chapter gives an overview of how to use your monitor, and its features. It shows an example fetal trace and gives some general practical information.

More About the Monitor

It can monitor fetal heart rate (FHR) and external uterine pressure (Toco), showing the patient data on its integral display, and saving up to 12 hours of patient data in its memory. It can output this data, realtime, on a strip chart recorder or OB **TraceVue** system. The data includes graphic trend data and text information about hardware and software configuration, date and time and so forth.

Additionally, you can download this stored data to a printer via a direct cable link, or to a remote obstetrical surveillance system such as OB **TraceVue** or to a PC running the FM-2 viewer utility software.

Monitoring Screen Frames

The monitoring screen is divided into frames.

Fetal Heart Rate Numeric (US1) Frame

This displays FHR, heart rate icon, alarm status icon, and speaker volume icon. The heart rate value shows the most recent calculated fetal heart rate. The heart rate icon blinks at the measured heart rate interval when a valid rate is present. The volume icon gives an indication of the speaker volume setting for the FHR

sounds. This icon changes when you adjust the speaker volume setting. The alarm icon is a bell. A diagonal line through the bell indicates alarms are disabled. A bell without a diagonal line indicates alarms are enabled.

When you connect a second ultrasound transducer, the heart rate frame includes the second fetal heart rate, heart rate icon, alarms status icon and speaker volume.

The trace offset icon appears in the heart rate frame if you have connected two ultrasound transducers and enabled the ultrasound trace offset.

Heart Rate Trend Frame

The heart rate trend frame displays a graphical representation of the fetal heart rate. The vertical scale corresponds to the selection of the recorder paper (30 to 240 BPM for US style paper, 50 to 210 for International style paper). The graph displays six minutes of data if the monitor is set for a print speed of three cm per minute, nine minutes of data when set for two cm per minute and 24 minutes when set to one cm per minute.

This frame shows two heart rate trends when you use two ultrasound transducers.

The normocardia lines make it easier for you to observe heart rate trend or heart rates that exceed limits. These are positioned at 110 and 150 BPM.

This graphic frame also displays heart rate data when you scroll through historical patient data in trend scroll mode.

Toco Numeric Frame

This frame contains the numeric value from the Toco transducer, representing uterine activity. It also shows the present Toco baseline value. You can adjust the Toco baseline.

Toco Trend Frame

The Toco trend frame displays uterine activity trend data. The scale is from zero to 100 in relative units. The graph displays six minutes of data if the monitor is set for a print speed of three cm per minute, nine minutes of data when set for

two cm per minutes, and 24 minutes when set to one cm per minute. This graphical frame also displays uterine activity data when you scroll through patient data.

Power Status Frame

This frame displays an icon to indicate the monitor's method of power. There is no indication of battery charge status when you are working from AC power.

Symbol	Definition	Symbol	Definition
	Monitor is powered by battery. Number of filled segments indicates battery charge status (battery fuel gauge). A fully charged battery shows all segments filled.		Monitor is operating from AC power.

Communications Frame

This frame shows the status of devices connected to the monitor's serial interface port. See Chapter 8, "Printing and Transmitting Records" for more details.

Time and Date Frame

This frame shows the current time and date for the monitor. You can change these when necessary; see "Setting the Time and Date" on page 19.

Patient ID Frame

This displays the patient identification, generated automatically by the monitor each time you switch on. It uses a time and date encoded identification scheme to ensure no duplication of identification. You can change this, entering an ID (such as name) if you want; see "Configuring Patient ID" on page 30.

Monitor Symbols

These symbols appear on the monitor and its associated equipment

Symbol	Definition	Symbol	Definition
	Remote marker input connector		Class II equipment symbol (double insulation)
	Drip-proof equipment classification		Type BF applied part symbol
15V ~ 1A	Power supply connector		Refer to accompanying documents
RS-232	RS-232 connector (symbol on monitor housing)		RS-232 connector (symbol on monitor label)
	Functional earth		Printer connection

Changing Monitor Settings

Using the Navigation Wheel

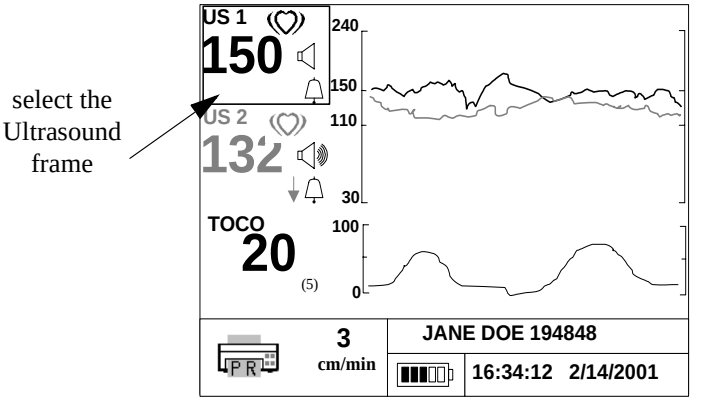
You navigate through, and make changes to, screen elements by rotating and pressing the navigation wheel. Rotate the wheel to highlight frames on the screen. When a frame is selectable it has a heavy box drawn around it. Press the wheel to select the frame.

The monitor's response may be effective immediately, or it may display a Level 2 menu that "pops up" on screen without removing the Level 1 menu.

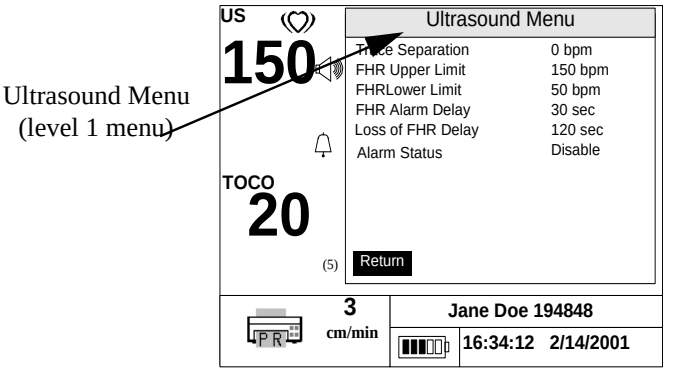
Example of a Change Operation

To change the fetal heart rate alarm status:

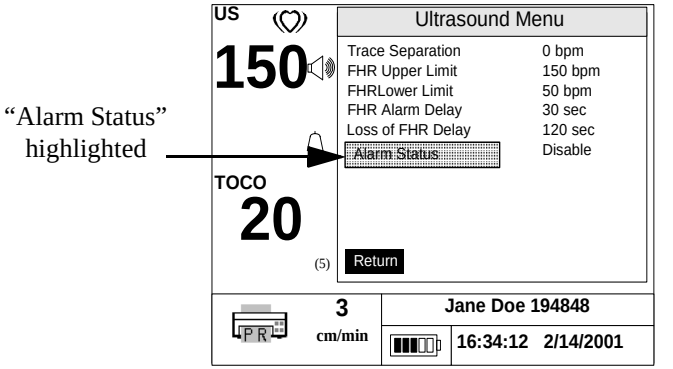
1. Rotate the wheel to highlight the Ultrasound frame. A heavy border appears around that frame.



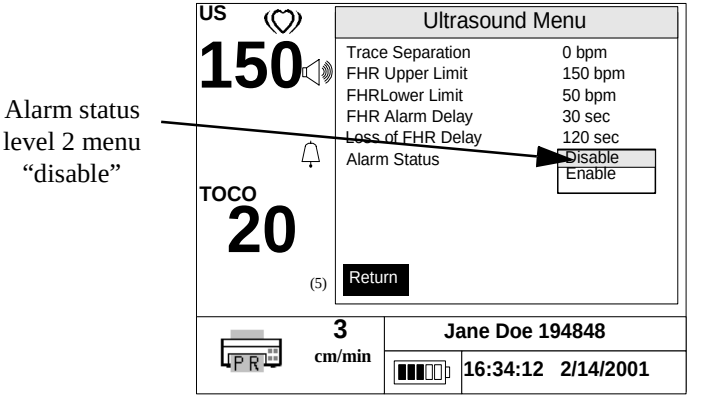
2. Press the wheel. The Ultrasound Menu appears. This is a Level 1 menu.



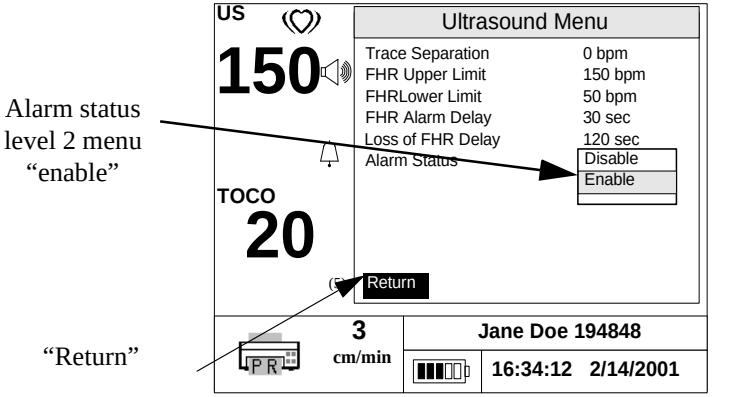
3. Rotate the wheel to highlight Alarm Status.



4. Press the wheel. A Level 2 menu appears and the current value is highlighted. This illustration shows Disable.



5. Rotate the wheel to highlight the value "Enable".



6. Press the wheel to activate the change.
7. Rotate the wheel to highlight "Return".
8. Press the wheel to return to the normal monitoring screen.

Changes take effect when you exit from the menu. While a menu is displayed, if no wheel or button activity occurs for 20 seconds, the menu closes and returns to the monitoring screen.

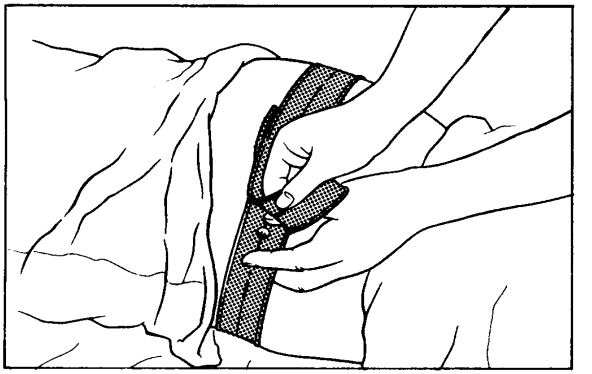
When this Guide tells you to “Select” an item, it means you must rotate the wheel until the item you want is highlighted. “Confirm” means press the wheel to activate your selection.

Preparing for a Monitoring Session

Before you start monitoring, visually inspect the monitor, transducers and accessories to make sure that all are in good condition. If any part is broken or damaged you should not use it.

Fastening a Belt

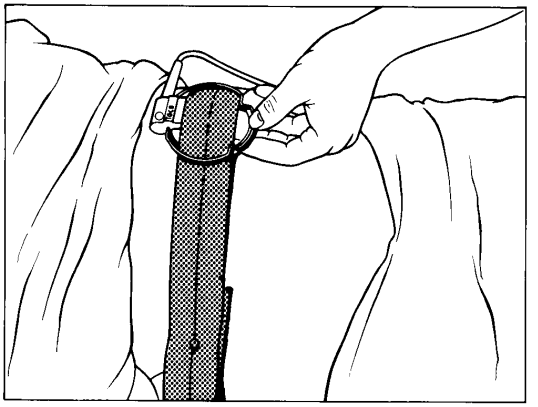
Arrange the belt around the patient until it is tight but still comfortable. Fasten it by pushing the fixing button through the overlapping section of the belt, with the point facing away from the patient. Ensure that the fixing button and the loose ends of the belt are at the patient’s side.



Do not overtighten the belt; excessive compression of the maternal abdomen is uncomfortable for the patient and may result in incorrect measurements.

Clipping a Transducer to the Belt

Secure the belt as described above. When you have positioned a transducer satisfactorily clip it to the belt, taking care not to catch the belt material in the edge of the ring clip. You can then slide the transducer along the belt to reposition it if necessary.



Every patient is different, and correct transducer placement is important to ensure proper monitoring.

Alternatively, you can fix a button to the transducer and use this to attach the transducer to the belt. See the Installation Note that comes with the Transducer Knob Adapter for assembly instructions.

Caution

Do not use the transducer's ring clip to secure the belt around the patient - you must use a fixing button on the belt for this. Using the transducer clip to secure the belt may damage the transducer and does not keep the belt in place reliably.

Connecting a Transducer to the Monitor

Connect the color coded transducers (brown for Toco, red for Ultrasound) to the matching color socket at the side of the monitor.

Eliminating Electromagnetic Interference

An electromagnetic field can interfere with the ultrasound transducer and cause a false heart rate reading that does not originate from the patient. Although this is rare, it might happen in the vicinity of large machinery. To avoid the possibility of these signals being misinterpreted as fetal heart rates, you should follow this procedure before you start monitoring whenever the monitor is used in a new location or if you know that electrical machinery is being operated in the vicinity.

Connect the ultrasound transducer to the monitor, do not yet position on patient, and observe the heart rate indications on the screen for 30 seconds. An intermittent display of random heart rates (this is called artefact) is acceptable. However, if there is a constant display of a heart rate lasting more than five seconds, this is an indication that there is a source of electromagnetic interference in the vicinity.

You can use the monitor in this environment if the artefact heart rate indication ceases when you:

- Move all line cords and line-powered equipment at least six feet away from the monitor. Remember to check for extension cords running behind or under the bed and for equipment in adjacent rooms.
- Remove the power cord from the monitor's power supply and operate from battery.
- Unplug the monitor's recorder and move it out of the vicinity.

If these measures do not result in the cessation of the heart rate artefact, you cannot use the monitor safely in this environment.

Configuring Patient ID

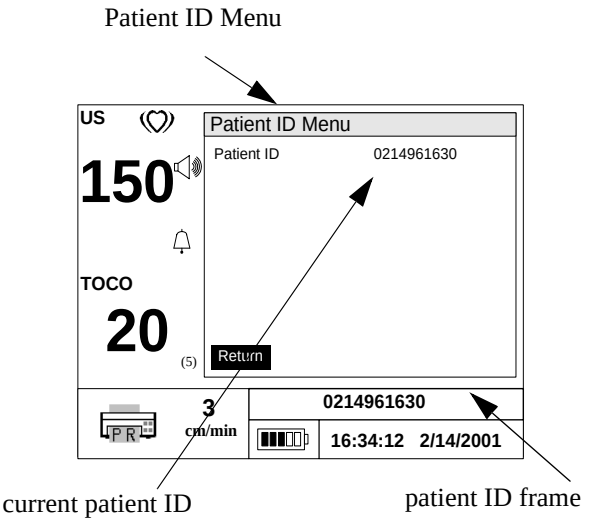
When you switch the monitor on, it creates a Patient ID based on the current date and time. For example, if you turn the monitor on at 4:37:54pm on May 11 2001, the Patient ID will be 051101163754.[1] (month.day.year.hour.minute.second).

1. The monitor always uses this format for the ID, even if you have chosen 12 hour time format, or DD.MM.YYYY date format.

If you want to give a more meaningful identification, you can change the ID to, for example, the patient's name, or perhaps medical record number. A subsequent change (or correction) of this patient ID automatically closes the current record and starts a new record with a new ID.

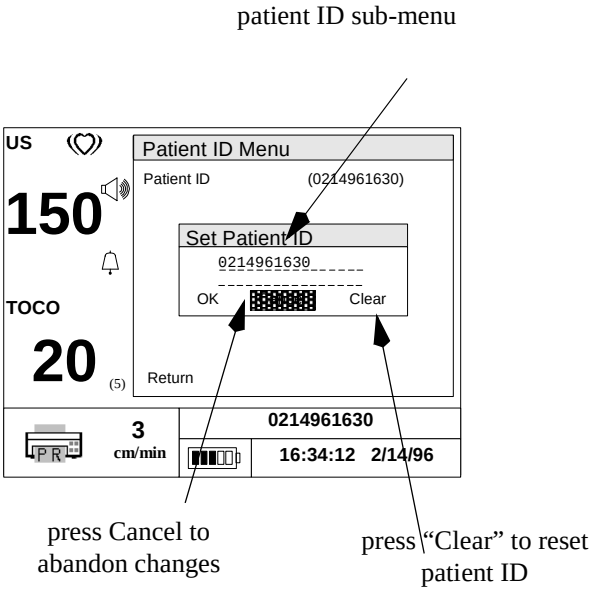
Use the Patient ID Menu to change the default patient identification.

1. Select the Patient ID frame.



2. Select the patient whose ID you want to enter.The monitor displays the Set Patient ID menu.
3. Rotate the wheel to highlight a character in the Patient ID.
4. Press the wheel to activate the character.
5. Rotate the wheel until the monitor displays the character you want. Available characters are 0-9, A-Z (uppercase only) and "space", with 24 character maximum.
6. Press the wheel to save the change. Repeat until you have completed the Patient ID.
7. Select:
   - **OK** to store this new Patient ID.
   - **Clear** reset the Patient ID to blanks.

Cancel to abandon your changes and leave the original patient ID unchanged.



Adjusting Alarm Limits

Always check that the current alarm limits are appropriate for your patient. If they are not, adjust them. Instructions for checking and adjusting alarms are given in the chapter for the parameter you are measuring. When you switch off the monitor, the most recently set alarm limits are retained. They are not reset to factory defaults when you next switch on.

Marking an Event

Use the remote marker to record significant events (for example, when pain medication is administered or when the mother changes position). This marker time is recorded on the fetal trace. There are two markers:

Clinician marker: clinician presses the marker key on the monitor. The trace is marked with a downwards facing arrow, in the uterine activity area of the trace.

Patient marker: patient presses the button on the remote event marker cable. The trace is marked with an upwards facing arrow in the heart rate area of the trace.

Multiple rapid presses result in partial printing of all marker arrows and full printing of the last one.

Finishing a Monitoring Session

Always switch off the monitor between patients to ensure that a new fetal trace and ID are generated when you switch on again for the next patient. If you allow the monitor to run without switching off between patients, it will store this "empty trace" in its memory. This is confusing when you use the scroll feature, and wasteful of paper when you print the fetal trace.

Configuration Settings

The monitor ships with some factory-set defaults for user-configurable items (such as alarm limits, alarm delays and so forth). In most cases, the monitor retains the most recent change to these values after it is switched off and then on again.

There are two exceptions. US trace separation value always returns to 0 and the monitor always generates a new patient ID when the power is cycled (that is, when the monitor is switched off and then on again).

Using the Battery

You can run the monitor for approximately six hours on battery power at room temperature of 25° C from a fully charged battery (with a minimum of two hours monitoring at 10° C from a fully charged battery). The age of the battery, operating temperature and number of recharge cycles affects this. A battery life cycle is approximately 200 charge/discharge cycles.

Low Power Warning

A low power warning occurs when the battery power is running low. The battery fuel gauge flashes, and a repetitive audible tone sounds. Remaining monitoring time is typically 30 minutes with a new battery at room temperature of 25° C. In an older monitor, in which the battery has had a number of recharge cycles, it may occur when fewer minutes remain.

The warning continues until the low power condition disappears (when you connect the monitor to an AC power supply) or until the system stops functioning because of the low power.You cannot silence it, and you cannot adjust its volume.

The monitor retains any stored fetal traces, even if it shuts down because of lack of battery power.

Recharging the Battery

Use the power supply to recharge the battery from an AC power source. This takes a maximum of 14 hours when monitoring simultaneously, or 8 hours if no monitoring occurs. Typical times are 11 hours if you are monitoring simultaneously, or 4.75 hours if no monitoring occurs.

Replacing the Battery

Life expectancy of a battery depends on the frequency and duration of use. We recommend replacing the battery every 2 years.

Only a trained service professional should change the battery; instructions are given in the Service Guide.

Replace the battery if it is known to be fully charged and the following conditions occur:

- battery discharges quickly when you are using it
- the remaining time in the battery after the battery alarm first occurs is less than 10 minutes.
- the battery does not recharge to full capacity (indicated by the battery fuel gauge on the monitor).

Storing

A stored battery loses capacity over time. To minimize loss of capacity, recharge the battery at least every six months. A battery typically has three to five years shelf life.

Getting the Best out of Your Battery

Unlike a nickel-cadmium battery, a lead acid battery does not have a “memory”, and so there is no need to discharge it before recharging it. Here are some tips to help you get the best out of your battery:

- Run the monitor from its power supply where possible.
- Recharge a stored monitor periodically.
- For convenience, recharge the battery fully after use.

Demonstration Mode

The monitor has a demonstration mode in which the monitor can perform all normal monitoring display, communications and printing activity using the internally generated data (except ultrasound audio output). You can change alarm limits, status and so forth. You enable and disable Demo mode using the Power status frame’s Service Menu. Switching the monitor off and then on again also disables Demo mode.

Points to note about Demo mode:

- The monitor displays the word >>Demo!<< in the Patient ID so that you can see that you are not viewing or monitoring real patient data.
- Connecting a transducer does not disable the Demo mode.
- Disabling Demo mode via the Service Menu, or switching the monitor off and then on again, automatically starts a normal record.
- The demo trace is stored in the memory each time you enter Demo mode. The Demo trace always has the ID >>Demo<< and contains the same trace data.

Caution

Do not mistake demonstration data for genuine patient data.

5
Monitoring Fetal Heart Rate

Monitoring fetal heart rate using ultrasound is recommended from the 25th week of gestation for non-stress or normal routine fetal monitoring. Performing imaging at the same time as ultrasound fetal monitoring may cause false FHR readings, and the trace recording may deteriorate.

FHR Monitoring

What You Need

- Ultrasound transducer
- Ultrasound gel
- Transducer belt and button

Preparing the Monitor

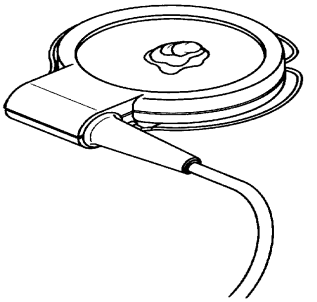
1. Switch the monitor on and make sure the normal monitoring screen appears on the display.[1]
2. Check the monitor's power source. If you are using battery power, check the power status frame to ensure that the battery has sufficient charge to complete the monitoring session. Use the power supply if the charge is too low.
3. Check for electromagnetic interference (see page 30).
4. Plug the Ultrasound transducer into the monitor's US1 socket.
5. Check, and if necessary change, the alarm settings (see page 43).

1. Never start a new monitoring session if the monitor has been left on from a previous session. Cycle the power (switch off then on again) before starting to monitor. This ensures that the monitor generates a new fetal trace record, with unique ID.

6. Adjust US1 speaker volume to mid level. If you are monitoring twins, adjust US2 to off.

Finding the Fetal Heart Rate

1. Fasten the belt around the patient.
2. Find the fetal heart position by palpation, auscultation or ultrasound imaging.
3. Apply a small amount of ultrasound gel in a thin layer to the transducer.



4. Apply the transducer to the patient, working it in a circular motion to ensure the gel layer makes good contact.
5. When you have a good signal clip the transducer in position on the belt. It can take approximately 10 seconds to get a valid HR signal.
6. Verify that the monitor is displaying a numeric fetal heart rate value. The heart rate icon flashes at the measured heart rate interval when a valid rate is present.

Warning

Periodically compare the mother's pulse with the FHR signal coming from the monitor to ensure that you are monitoring fetal heart rate and are not accidentally recording maternal heart rate. Do not mistake a doubled maternal heart rate for FHR. For the same reason, be very careful when interpreting a trace if you suspect fetal demise. The maternal heartrate may be atypically high and therefore confused with that of a live fetus.

Warning

Never immerse the ultrasound transducer in liquid when it is connected to the monitor unless the monitor is running on battery power only, and is not directly connected to the AC power supply, and/or an other device (such as a printer).

Interpreting the Data

However, interpretation of the trace is left to the clinician's judgement. Remember that cardiac arrhythmias or other abnormalities can cause erratic trace data.

Disconnect unused ultrasound transducers. Continuous mechanical influence of the unused transducer could result in an artificial trace.

Monitoring Twins

If you have two ultrasound transducers, you can monitor a second fetus on the second ultrasound channel. You require a second belt.

Finding the Second FHR

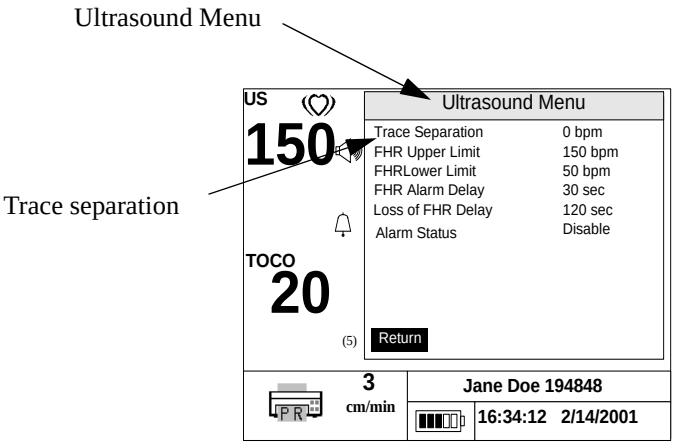
Connect the second transducer to the second ultrasound socket (US2). Follow the previous steps to acquire the heart rate for the first fetus. Decrease the speaker volume for US1, and increase the volume on US2 so that you will be able to hear the second heart. Locate the second fetus, and verify that the monitor displays the numeric fetal heart rate values for both fetuses. The second heart rate icon flashes at the measured heart rate interval when a valid rate is present.

Separating Two FHR Traces

To help you distinguish between fetal traces, you can offset the second fetal heart rate by 20 BPM. The second heart rate appears on the trace 20 BPM lower than it really is. The heart rate value shown in the numeric frame is not affected.

Use the Ultrasound menu to activate trace separation:

1. Select the FHR numeric frame to display the Ultrasound menu



2. Select Trace Separation.

   When trace separation is active, ↓ flashes next to the US2 numeric value.
3. Rotate the wheel to display either 0 (no trace separation) or 20 (traces separated by 20 BPM). Confirm your choice.

Adjusting Ultrasound Volume

Press the speaker button and rotate the navigation wheel to increase or decrease the amplitude of the ultrasound heart volume. The volume icon gives you an indication of the speaker volume.

US1 You do not need to connect a transducer to the US1 channel to change the volume of US1.

1. Press the speaker button once to select the volume for US1.
2. Rotate the wheel to adjust volume.
3. Press the speaker button to save the setting.

US2 Connect a transducer to US2 channel. It is not necessary to connect a transducer to US1 first.

1. Press the speaker button twice to select the volume for US2.
2. Rotate the wheel to adjust volume.
3. Press the speaker button to save the setting.

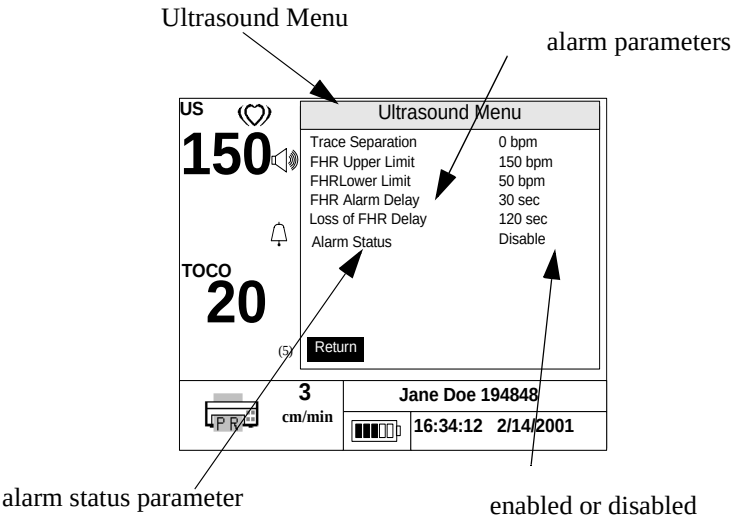
Understanding FHR Alarms

The monitor can alert you if the fetal heart rate goes above or below the alarm threshold for a time that exceeds the alarm delay setting, or if it loses the heart rate signal entirely. You can configure these limits and times. You must ensure the alarm status is set to enable (via the ultrasound menu, see page 44) if you want the monitor to warn you if an alarm condition occurs.

Alarm type	what you see and hear	Silencing the alarm	...what happens
Alarm limit exceeded	Fetal heart rate numeric value flashes. Monitor sounds a warning tone.	Press	The monitor is silenced. The alarm icon is crossed through, and the FHR value continues to flash while alarm condition persists. When alarm condition ends, visual and audible alerts are reactivated. The alarm icon is no longer crossed through.
Signal loss alarm	Fetal heart rate frame flashes --- Monitor sounds a warning tone.		The monitor is silenced. The alarm icon is crossed through and the FHR value continues to display dashes while alarm condition persists. When alarm condition ends, visual and audible alerts are reactivated. The alarm bell icon is no longer crossed through.

Configuring FHR Alarms

1. Select the Ultrasound Menu



2. Rotate the wheel to highlight the alarm limit you want to change.
3. Press the wheel to select it. The monitor highlights the current value.
4. Rotate the wheel until the desired new limit is shown.
5. Press the wheel to confirm this choice.
6. Select “Return” to go back to the main monitoring screen when you have configured the alarm parameters appropriately for your patient.

These settings remain active even after the monitor is switched off and then on again. Always check that the settings are appropriate for each patient before you start monitoring her.

Alarm Settings

Alarm	Comments
FHR upper limit	Fetal heart rate value at or above which the alarm sounds. Range: 110-220 BPM (increments of 5) Factory default: 150 BPM
FHR lower limit	Fetal heart rate value at or below which the alarm sounds. Range: 50-120 BPM (increments of 5) Factory default: 110 BPM
FHR alarm delay	Time during which the fetal heart rate is at, or exceeds, alarm limit before alarm sounds. Range: 10-120 seconds (10 second increments) Factory default: 60 seconds
Loss of FHR delay	Time delay between monitor losing a valid fetal heart rate and then sounding the alarm. Range: 10-120 seconds (10 second increments) Factory default: 120 seconds
Alarm status	**Enable**: All alarms are on. **Disable**: All alarms are off (default)

Alarm Defaults The monitor saves alarms settings until they are next changed. When you switch the monitor on it uses the most recently set alarm settings. It does not revert to a factory-set default.

Monitoring Twins When you are monitoring twins, the alarm settings apply to both FHR1 and FHR2.

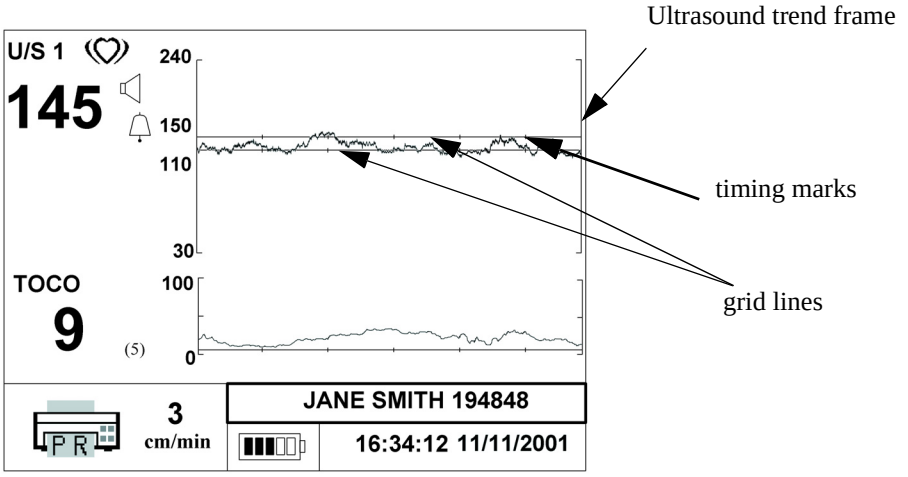
Determining FHR Acceleration Using Grid Lines

During normal monitoring, the screen displays two parallel horizontal lines in the ultrasound trend frame, located at 110BPM and 150 BPM to provide a reference for estimating heart rate (normocardia).

To help you determine heart rate accelerations, particularly when performing a non stress test (NST), you can narrow the distance between these lines to 15 BPM. You can also move this pair of lines on the trace. For example, turn the navigation wheel until the lower grid line lies on the heart rate baseline; use the other grid line as a reference to determine the duration and frequency of accelerations of at least 15 BPM. The timing marks are one minute apart.

1. Press ⟺, located on the monitor's front panel.

   This automatically relocates the horizontal lines to a distance of 15 BPM apart.



2. Rotate the navigation wheel to move these lines, as a pair, up and down. They return to their normal position (at 110 and 150 BPM) if you do not use the wheel for 30 seconds or if you press ⟺ again.

The first time you use grid line mode in a monitoring session the lines are at 120 BPM and 135 BPM. If you re-enter the mode during the same session, the monitor redraws them at their most recent location.

6
Monitoring Uterine Activity

The monitor records the frequency and duration of contractions but not their intensity. The intensity is a relative measurement that depends on patient size and anatomy, patient position, transducer position and belt tension.

To obtain an absolute measurement, you must monitor intrauterine pressure (not possible using this monitor).

Toco Monitoring

What You Need

- Toco transducer
- Transducer belt and button

Preparing the Monitor

1. Switch the monitor on and make sure the normal monitoring screen appears on the display.
2. Check the monitor's power source. If you are using battery power, check the power status frame to ensure battery has sufficient charge to complete the monitoring session. Use the power supply if the charge is too low.
3. Plug the Toco transducer into the monitor's Toco socket.

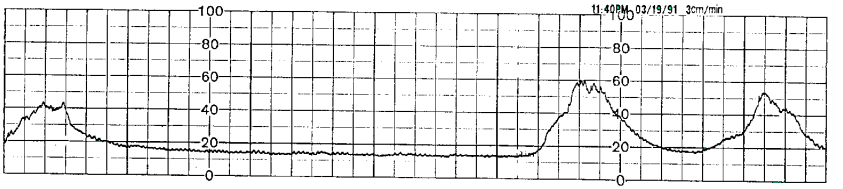
Acquiring Uterine Activity Data

1. Fasten the belt around the patient.
2. Place the transducer face on the uterus's fundus[1].

1. The pressure-sensing button is on the transducer face.

3. Clip the transducer in position on the belt.
   Tension the belt enough to keep the transducer in complete contact with the skin.
4. Go to Toco menu and check baseline value. Adjust if necessary.
5. Press the Toco Baseline button **0** once, between contractions. This zeroes the display and trace to the Toco baseline value.
6. Start monitoring.

The following example trace shows three contractions.

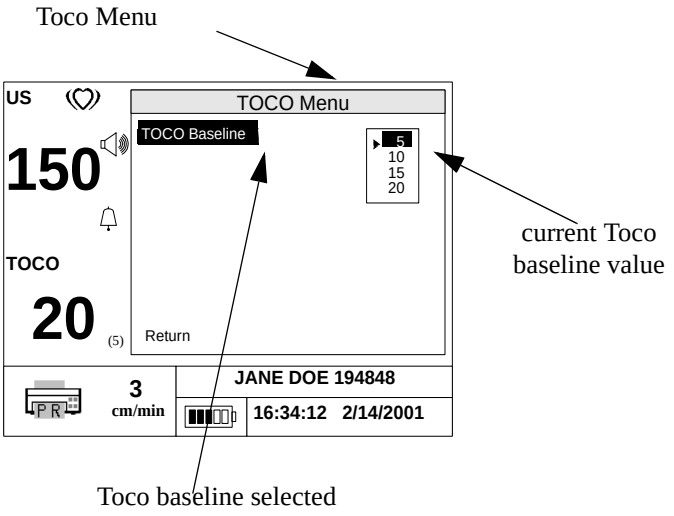


Setting the Toco Baseline

Use the TOCO menu to change the Toco baseline value:

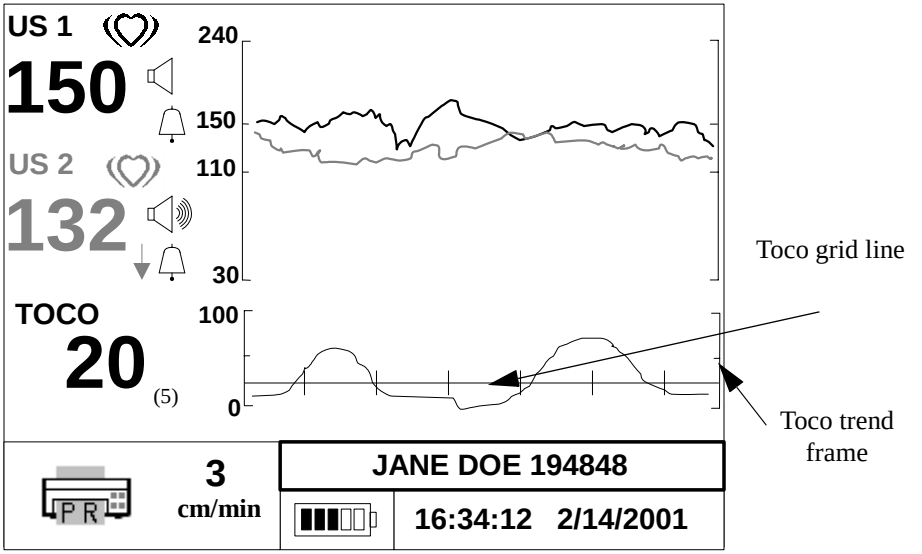
1. Select the Toco frame.
2. Select Toco Baseline menu item.
3. Choose a baseline value.
   A pop-up menu allows you to choose a baseline value of 5, 10, 15 or 20. The current value has an arrow next to it. Rotate the wheel to move the

cursor up and down the list. Confirm when the required baseline value is highlighted.



Using the Toco Grid Line

The Toco trend frame has a line, with timing marks, to help you easily locate the Toco baseline. If the baseline changes, this line relocates to the new value.



7
Using Trend Scroll

The monitor can store up to 12 hours of patient data. Usually, you see only the most recent few minutes of this data on screen. If you want to see earlier data from the present monitoring session, or historical data from previous monitoring sessions of other patients, you can use the trend scroll. The Patient ID changes as you scroll through the fetal traces so you always know whose data you are viewing.

While in trend scroll data you can still see the vital signs for the current monitoring session in the US and Toco numeric frames.

Entering Trend Scroll

Press ←→ to enter trend scroll mode. This marker appears on the screen to show that you are in trend scroll mode. Turn the navigation wheel clockwise to review older data, counter-clockwise to show more recent data.

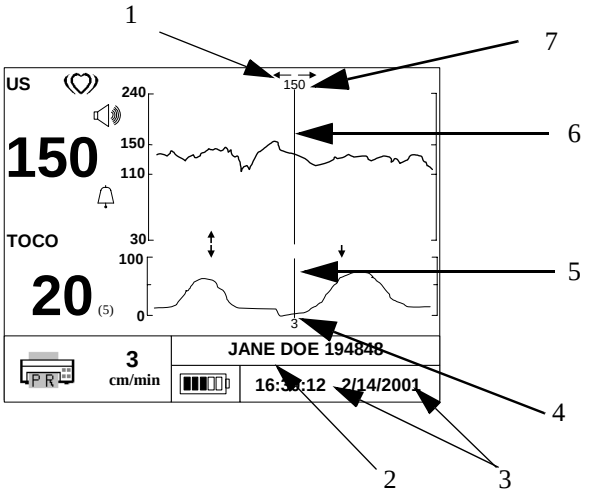
The trend screen does not display data from two patients at the same time. When you get to the end of one fetal trace, you will see an empty frame. If you continue to scroll, the screen begins to fill with data from the previously stored fetal trace. You can view all stored fetal traces in this way.

When you get to the end of all stored fetal traces, the monitor beeps if you try to turn the wheel further.

Rotate the wheel slowly and the trend scrolls slowly. If you rotate it slightly more quickly, the scrolling speed increases. The top scroll speed is fixed and not determined by how quickly you rotate the wheel.

What Data Will I See?

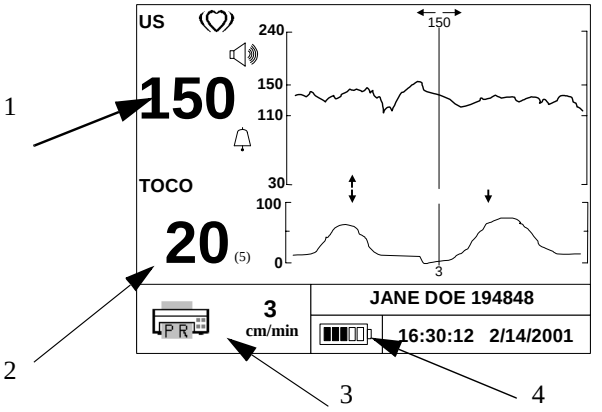
Stored Data



1. Trend scroll mode “on” indicator.
2. ID of patient whose trend data is being reviewed (you may scroll to a patient other than the patient currently being monitored).
3. Time and date when data values shown at reference line were recorded.
4. Toco value at reference line.
5. Vertical reference line centered in the Toco trend frame.
6. Vertical reference line centered in the heart rate trend frame.
7. FHR value at reference line.

The lines, (5 and 6) centered in the FHR and Toco trend frames, are the reference points through which Toco and FHR values pass as the data scrolls through the display.

Current Data When you are in trend scroll mode you will still see important (unscrolled) numeric data for the current monitoring session.



1. FHR of **current** monitoring session
2. Toco value of **current** monitoring session
3. **Current** communications status
4. **Current** power status

Printing a Trend Section

While in trend scroll mode you can mark the start and end boundaries of a section of trend and print it. Ensure that you have a printer or the recorder attached when you request a print.

1. While in trend scroll mode, press the navigation wheel. The monitor displays the Mark Print Boundary menu.
2. Choose “Yes” to accept the time at the center of the screen as the first boundary of the section you want to print.
3. Rotate the wheel to scroll through the trend until the time at the center of the screen represents the second boundary of the section you require. Take care that this is still within the same patient fetal trace.
4. Press the wheel again to display the Mark Boundary and Print menu.

5. Select Yes to mark the second boundary and send this to the printer or recorder. If you press “Clear Boundary” now, the first boundary marker is cleared, allowing you to reset it.

Exiting Trend Scroll Mode

Press the trend scroll button a second time to leave this mode. The monitor automatically returns to the main monitoring screen if you do not touch the navigation wheel for 30 seconds.

8
Printing and Transmitting Records

This chapter tells you how to transmit fetal traces from the monitor to

- the monitor's own recorder
- a PC printer
- a system, such as OB **TraceVue** or a PC running FM-2 viewer utility software.

Setting up the Modem

Before you can transmit fetal traces to a remote system you need to install, setup and initialize an approved modem at the monitor, and also at the remote system.

Number to Dial

Into the monitor you must program the telephone number of the remote modem it must contact. If you transmit to only one remote modem, you will only need to enter this number only one time. However, if you dial a variety of remote modems, you must set this each time you want to dial a different modem.

1. Select Communications Menu -> Number to Dial.
2. In the "Set Phone Number" window, turn the navigation wheel to highlight the first character position and press to select. Rotate the navigation wheel to cycle through the available characters and digits for this position. Press the wheel to fix your chosen digit.
3. Move to the next position and repeat, until the complete telephone number is entered.
4. Select "OK

Modem Initialization

For full details, see the FM-2 Service Guide.

Default Initialization String

FM-2 uses the modem's default values. If data transfer works with these, then you do not have to enter any modem initialization string.

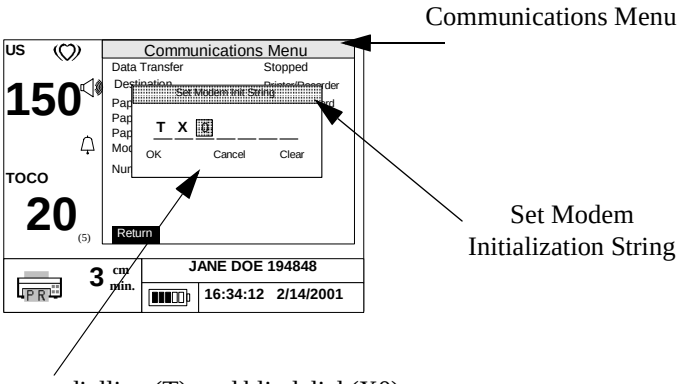
1. Select Communications Menu -> Modem Initialization.
2. If you need to enter any initialization data, the procedure is the same as described for entering the modem telephone number.

Pulse/Tone Dial

A telephone system may use either pulse, or tone, dialling. The modem needs to know which. If the modem's default value is not appropriate for your telephone system, you will have to change it. Enter either "P" for pulse, or "T" for tone in the modem initialization string, as appropriate for your system.

Local Branch Exchange

The modem expects a public line with a continuous tone. If you use a local branch exchange, this might not occur. Therefore you should enter "X0" (this is known as the 'blind dial') in the initialization string.



Printing and Transmitting Records

You can print realtime to the recorder, or to an OB **TraceVue** system. You cannot print realtime to a printer, or to FM-2 viewer. You cannot simultaneously print a paper trace and link realtime to OB **TraceVue**.

A fetal trace is never deleted from the monitor after transmission or retransmission. The only way a fetal trace is erased from the monitor is if the memory space is needed by the current monitoring session. The current fetal trace gradually overwrites the oldest fetal trace completely.

Process Overview

The steps are

1. Choose Paper Output Type (recorder/printer only)
2. Choose Output Destination
3. Start Data Transfer
4. Choose which records to transfer (system batch, FM-2 viewer, patient records only).

Note—The monitor ignores any choice that is not appropriate for the task you are performing (for example, if you choose “System Batch” the monitor will ignore all “Paper Output” settings).

Choosing Paper Output Type

For output to the printer or recorder, you need first to specify what type of printed output you require. Select **Communications Menu -> Paper Output**. Choose from:

Summary list	a list of all stored patient IDs (available for printer only).
Current Record	print the current patient fetal trace, realtime, on the recorder, from now until data transfer stops (available for recorder only).
Patient Records	one or more patient fetal traces (available for both printer and recorder).

Choosing Output Destination

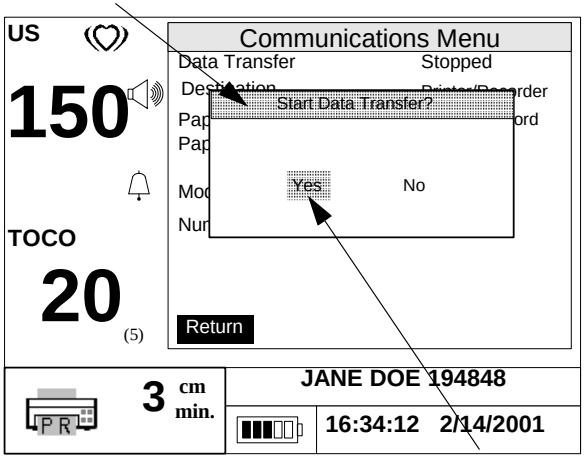
After choosing the printed output type, you must specify a destination. For all other types of output, you only have to specify the output destination. Select **Communications Menu -> Destination**. Choose from:

- **Printer/Recorder** • use with “summary list”, “current record” or “patient records”.
- **FM-2 viewer** • use to send stored fetal traces either directly, or via a modem, to FM-2 viewer software. With a modem connection, the destination phone is automatically dialled before the first fetal trace is transferred and hung up after the completion of the final fetal trace transfer.
- **System Online** • send the current patient fetal trace, realtime, to OB **TraceVue**, from now until data transfer stops. Note that a simultaneous printed trace output is not possible with this choice.
- **System Batch** • use to send stored fetal traces to OB **TraceVue** via a modem link. The destination phone is automatically dialled before each fetal trace is transferred and hung up after the completion of each transfer.

Starting the Transfer

After choosing the destination, you must start the transfer. Select **Communications Menu -> Data Transfer** and then "**Yes**" to start the transfer.

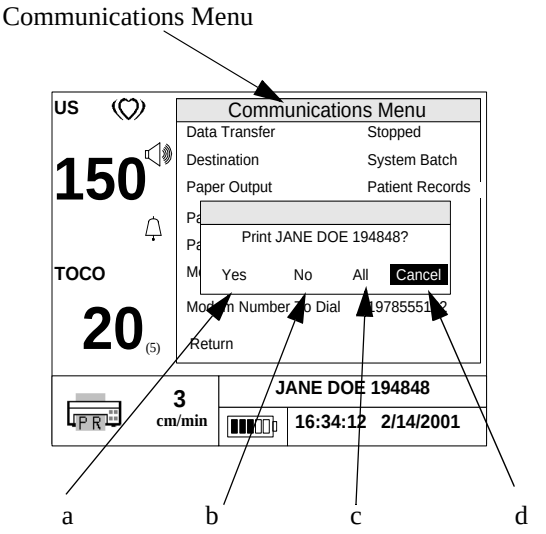
Select "Data Transfer"



select "Yes" to start data transfer

Choosing Which Fetal Traces

When you choose “Patient Records”, “System Batch”, or “FM-2 viewer” the monitor prompts you with the ID of the most recent patient



You can choose:

a. Yes: print/transfer this fetal trace.
b. No: do not print/transfer this fetal trace, display next patient ID.
c. All: print/transfer current patient fetal trace and all subsequent patient fetal traces.
d. Cancel: return to the Communications Menu.

During realtime printing on the recorder, or realtime monitoring on OB **TraceVue**, if the communication is interrupted, the monitor tries to re-establish communication once the problem is cleared.

Communication Status

Communication status	You see this when...	Comments	Port
	...the monitor has successfully detected its modem and is trying to connect with another modem	The data transfer dialog box shows the dialing number, and dialing starts automatically. You will hear the dial tone, and dialing process from the modem speaker.	Serial
	...the modem successfully connects with another modem	Transfer occurs automatically when the monitor and remote computer are connected. The data transfer dialog box shows the ID of the fetal trace being transferred, the total number of traces for transfer, and the percentage of the transfer that has already happened. Each fetal trace contains an integrity check. If it fails the check, the fetal trace is automatically retransmitted. If it fails a second time, the monitor displays a warning message and cancels the transfer.	Serial
	...the monitor detects that a PC is connected to the communications port	The monitor and external PC can communicate directly with each other. If a slash appears through the PC this means that communication has been interrupted. The slash will go away when communication resumes.	Serial
	...the monitor is starting to print at the recorder.	The icon is displayed when data transfer is initiated. The icon is accompanied by the present setting for the print speed. When it flashes, this indicates that the device needs attention, for example when the paper is low or runs out, or if the monitor detects a recorder error. If a slash appears through the PC this means that communication has been interrupted. The slash will go away when communication resumes.	Parallel
	...the monitor is starting to print at the printer.	The icon is displayed when data transfer is initiated. The icon is accompanied by the present setting for the print speed.	Parallel

Recommended Modems and Printers

These have been tested and are supported by Agilent. The list is correct at time of print, but the list of recommended modems and printers may be revised or updated periodically. Check with your local Response Center if you need further details.

Modems

Multi-Tech MT-5600ZDX (use modem's default initialization string)

Nokia 6210 cellular phone modem.

Printers

HP DeskJet 640c

HP DeskJet 840c

HP Deskjet 990Cxi

Communications

Serial Port Communications

The monitor has an RS232 interface port for communications to:

- a modem
- a cellular telephone modem
- a PC/AT computer.

The RS232 communications protocol supports:

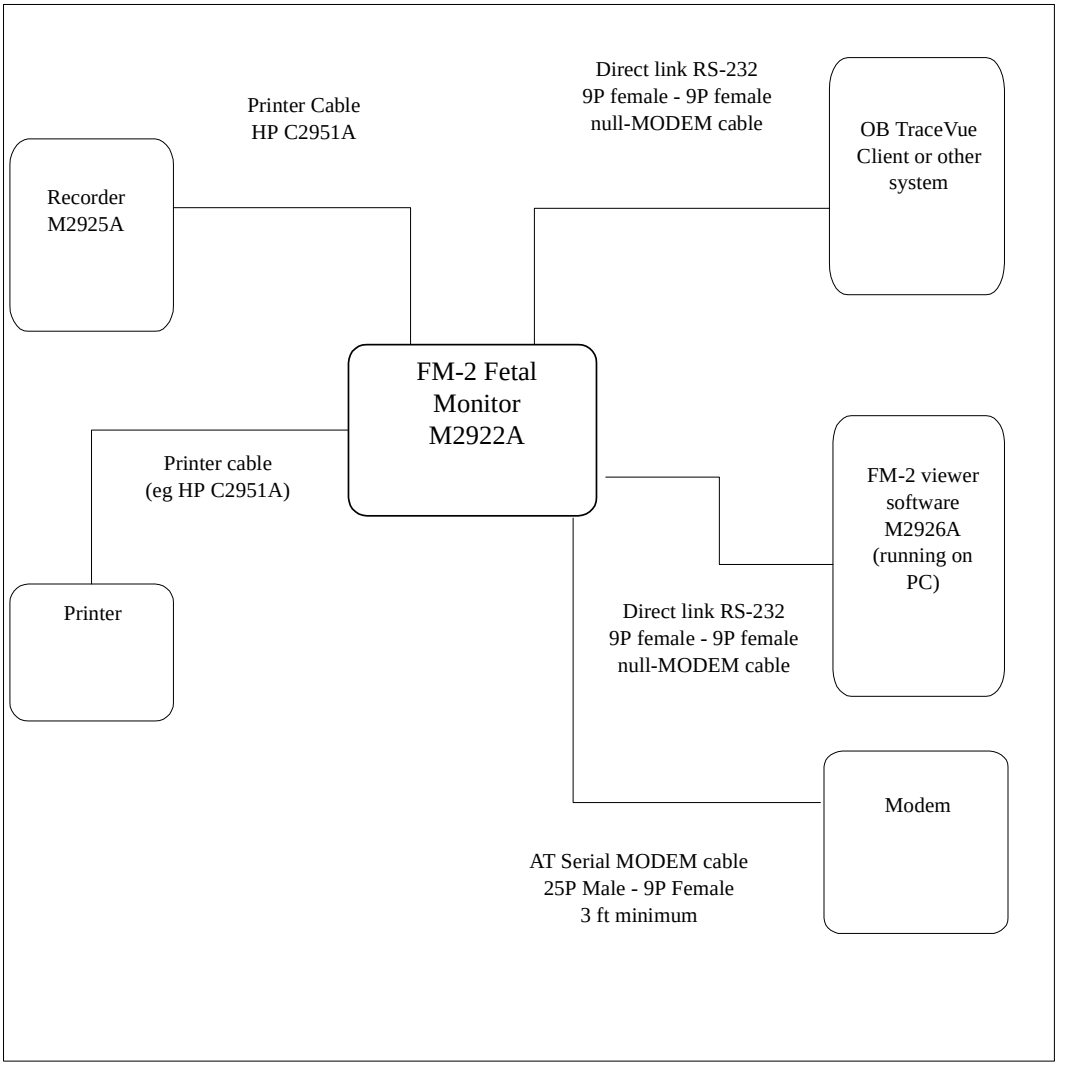
- direct connection to OB **TraceVue**
- direct patient data transfers to FM-2 viewer
- communications with a Nokia 6210 cellular phone modem
- communications with a MultiTech systems model MT-5600ZDX modem.

Parallel Port Communications

The monitor has a PC parallel port for communications with

- printer
- FM-2 (M2925A) recorder

Cabling


Direct link RS-232
9P female - 9P female
null-MODEM cable
Printer Cable
HP C2951A
OB TraceVue
Client or other
system
Recorder
M2925A
FM-2 Fetal
Monitor
M2922A
Printer cable
(eg HP C2951A)
FM-2 viewer
software
M2926A
(running on
PC)
Printer
Direct link RS-232
9P female - 9P female
null-MODEM cable
Modem
AT Serial MODEM cable
25P Male - 9P Female
3 ft minimum

Cable to....	Comments
...Recorder	Comes with recorder. Replacement can be ordered under: HP C2951 or replaced with PC parallel printer cable (conforming to IEEE 1284)
...Printer	Might come with printer or buy locally. Replacement can be ordered under: HP C2951A or replaced with PC parallel printer cable (conforming to IEEE 1284)
...OB **TraceVue** client	Order OB **TraceVue** M1380C option K10
...PC running FM-2 viewer	Comes with FM-2 viewer software.
...Modem	Comes with modem (if not, locally source 25P Male -9P female, minimum length 3ft)
...Cellular telephone with supporting-modem capability	Comes with cell phone. If not, source 25P Male - appropriate cell phone connection from cell phone manufacturer or other supplier.

9
Cleaning

This chapter tells you how to care for your system.

Monitor

Warning

Unplug the monitor and recorder from the AC power source and detach all accessories before cleaning. Do not immerse the monitor in water or allow liquids to enter casing.

Caution

Take extra care when cleaning the display surfaces, which are sensitive to rough handling. Rub the lens that covers them with a soft, dry cloth.

Keep the external surface clean and free of dust, dirt and residual liquids. Clean with a damp cloth using mild soap and water or hospital approved, non-abrasive disinfectants.

Transducers (Cleaning and Low Level Disinfection)

Before starting cleaning or disinfection, carefully review the technical information and follow all the precautions for use, safety, storage and disposal of the cleaning and disinfecting agents as listed by their manufacturers.

For devices intended for use on immunocompromised patients, use sterile water for rinsing and a sterile towel for drying the device during the cleaning and disinfection process.

The Blue Ultrasound and Toco transducers are protected against the effects of continuous immersion in water according to IEC 529 IP 68.

Do not:

- immerse a transducer in water when it is connected to the monitor if the monitor is running on AC power.
- handle transducers roughly. This could damage the cover, piezoelectric crystals and mechanical movement. Transducer covers are made of soft plastic; avoid contact with hard or sharp objects.
- flex the cables excessively.
- allow cleaning solutions or transducers to exceed a temperature of 45^{o}C (113^{o}F).
- autoclave the transducers and cables or heat them above 70^{o}C (158^{o}F).
- permit the Toco transducer's ventilated cable connector to become wet as liquid can enter the ventilation tube through capillary action.

Caution

Do not immerse the transducer connectors during any stage of the cleaning/ disinfection process.

Caution

Do not autoclave. Do not gas sterilize.

The following cleaning and low level disinfection procedures have been validated.

The cleaning procedure will be more effective in reducing contamination if cleaning is done prior to drying of adherent visible soil (for example, organic matter or other debris) on the transducer.

Do not reuse alcohol for disinfection. Cidex® is reusable (see manufacture's instructions).

<table>
<tr><th colspan="2">Cleaning and Disinfecting</th></tr>
<tr><td colspan="2">Cleaning</td></tr>
<tr><td colspan="2">1. Clean the transducer thoroughly using potable tap water and then a cleaning agent such as an enzymatic detergent. Prepare the detergent as recommended by its manufacturer. Scrub the transducer in the detergent using a soft bristled brush for five (5) minutes.</td></tr>
<tr><td colspan="2">2. Rinse the device with clean tap water for at least one (1) minute to remove detergent.</td></tr>
<tr><td colspan="2">3. Visually inspect the transducer. If adherent soil is still present, repeat steps 1 and 2.</td></tr>
<tr><td colspan="2">4. Dry the transducer thoroughly with a clean, soft towel.</td></tr>
<tr><td colspan="2">Disinfecting
Use only one agent for disinfecting at any given time.</td></tr>
<tr><td>Using 70% Isopropanol[a]</td><td>Using Cidex®</td></tr>
<tr><td>5. Submerge the transducer in 70% Isopropanol for a minimum of ten (10) minutes, but not more than thirty (30) minutes.</td><td>5. Submerge the transducer in activated 2.4% Glutaraldehyde solution (Cidex®). Prepare the solution according to the manufacturer's recommendations. Soak the transducer in the solution for a minimum of ten (10) minutes, but no more than thirty (30) minutes at 20-25°C.</td></tr>
</table>

Cleaning and Disinfecting	
6. Rinse the transducer with potable tap water, ensuring that all parts are in contact with the water, for at least one (1) minute to remove residual alcohol.	**6**. Rinse the device by immersing it in three separate copious volumes of potable tap water. Each rinse should be a minimum of one (1) minute in duration. Use fresh portions of water for each rinse. (Residues of Cidex® that remain on the transducer may cause adverse reactions such as skin irritation in the patient.)
7. Dry the transducer thoroughly with a clean soft towel.	
8. Follow your facility's post-processing handling procedures to eliminate or minimize recontamination of the device before reuse. Contact your facility's Infection Control Office or Epidemiologist for information regarding such procedures.	

a. For more information regarding cleaning agent compatibility, refer to the instructions/information supplied by the manufacturer.

The following disinfecting brands are believed to be compatible with the materials of the transducers described in this manual. However the performance of these disinfectants has not been validated for use with the transducers described here.

Aldehyde-based	Buraton liquid®, dilution of formaldehyde (3-6%), Gigasept®, Kohrsolin®
Alcohol-based	Ethanol 70%, Cutasept®, Hospisept®, Kodan®-Tincture forte, Sagrosept®, Spitacid®, Sterilium fluid®

Cleaning Belts

Wash soiled belts with soap and water.

Caution

Water temperature must not exceed 60°C (140°F).

Recorder

Warning

Unplug the recorder from the AC power source and detach all accessories before cleaning. Do not immerse the recorder in water or allow liquids to enter the case.

Clean the print head at least once a year or more often if necessary. Wipe the printhead and roller with a cottonbud soaked in isopropyl alcohol.

10
Using the Recorder or Printer

This chapter tells you how to install, set-up, and use the optional recorder (M2925A) and how to connect the monitor to a recommended printer.

In an antepartum environment, you can stand the monitor on top of, or close to the recorder for printing realtime. In a shared-recorder configuration where several monitors are used without a recorder, the monitors containing stored fetal traces collected from monitoring session(s) are brought to the printer for printing at a later time.

Warning

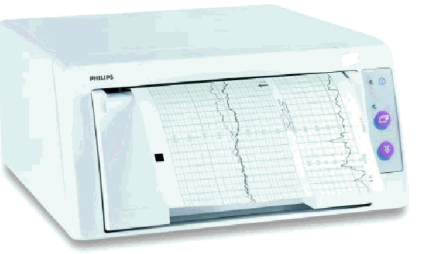
Disconnect the printer or recorder from the AC power before connecting them to the monitor.

Caution

General purpose personal computers, printers and modems are not designed to meet the electrical safety requirements of medical devices. Connect them with a cable of sufficient length to locate them outside of the patient vicinity. This means a minimum distance of 1.5 meters from the patient's bed or chair. Do not connect the FM-2 recorder to the monitor at the same time as a non-medical device (computer, printer or modem) if the recorder is located in the patient vicinity. For additional information refer to IEC/EN Standard 60601-1-1.

Working with the Recorder

Installing the Recorder



Place the recorder on a solid surface. Connect the communications cable to the connector at the back of the recorder, marked . Connect the other end to its mating connector at the back of the monitor .

Attach the AC line cord to the IEC receptacle at the back of the recorder. Connect the other end to an appropriate AC outlet.

Warning

The power receptacle must be a three-wire grounded outlet. Never adapt the three-prong plug from the power supply or accessory to fit a two-slot outlet. If the outlet has only two slots, make sure that it is replaced with a three-slot grounded outlet before attempting to operate the monitor.

Warning

Do not connect to an electrical outlet controlled by a wall switch

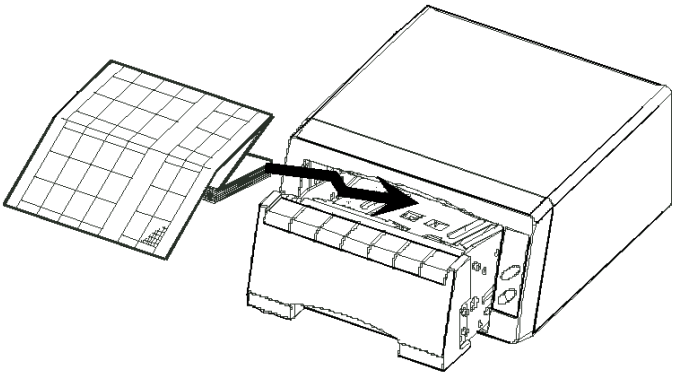
Warning

SHOCK HAZARD: Do no attempt to connect or disconnect a power cord with wet hands. Make certain that your hands are clean and dry before touching a power cord.

Loading Paper

The printer is configured for Philips fetal monitor paper. Do not use paper from any other manufacturer. It might damage the printer.

1. Unwrap the paper.
2. With the printed grid visible, unfold one page from the top of the pack and lay it forwards across the top of the paper drawer. Make sure the Toco grid area is closest to the recorder keys.
3. Slide the paper into the paper tray:



4. Slide the paper drawer into the recorder.

Annotating Paper

Some types of pens may distort the paper. It is advisable to try out the pen on a piece of the same type of recorder paper.

Use only the following types of paper:

Product Number	Country	FHR Scale	Color of Grid	kPa Scale	Highlighted 3cm Lines
M1910A	USA/Canada	30-240	Orange	No	Yes
M1911A	International	50-210	Green	Yes	No
M1913A	International[a]	50-210	Green	No	Yes

a. Not available in Europe. Used mainly in Japan.

Storing Recorder Paper

Recorder paper is not intended for long-term archival storage. Another medium should be considered if this is required.

Dyes contained in thermal papers tend to react with solvents and other chemical compounds that are being used in adhesives. If these compounds come into contact with the thermal print, the print may be destroyed over time. You can take the following precautionary measures to help avoid this effect.

- Store the paper in a cool, dry and dark place.
- Do not store the paper at temperatures over 40°C (104°F).
- Do not store the paper where the relative humidity exceeds 60%.
- Avoid intensive light (UV light), as this may cause the paper to turn gray or the thermal print to fade.
- Avoid storing the thermal paper in combination with the following conditions:
  - Papers that contain organic solvents. This includes papers with tributyl and/or dibutyl phosphates, for example recycled paper.
  - Carbon paper and carbonless copy paper.
  - Products containing polyvinyl chlorides or other vinyl chlorides for example (but not exclusively) document holders, envelopes, letter files, divider sheets.
  - Detergents and solvents, such as alcohol, ketone, ester and others, including cleaning and disinfecting agents.
  - Products containing solvent-based adhesives such as (but not exclusively) laminating film, transparent film or labels sensitive to pressure.

To ensure long lasting legibility and durability of thermal printouts, store your documents separately in an air-conditioned place and use

- only plasticizer-free envelopes or divider sheets for protection.
- laminating films and systems with water-based adhesives.

Using such protective envelopes cannot prevent the fading effect caused by other, external agents.

Using the Recorder

Connect the recorder to the monitor. Switch the recorder on using the AC switch on the rear of the recorder. An LED on the front confirms that the recorder is attached to an AC source and powered on.

Enable the recorder using:

1. Select Communications Frame
2. Select **Communications menu -> Destination -> Printer/Recorder**. The recorder icon displays in the Communications frame.
3. Select Paper Output -> Current Record (or Patient Records)
4. Select Data Transfer -> Start Data Transfer? -> Yes

See “Printers” on page 62 for full details of how to select which fetal traces to transfer.

Check that the recorder is feeding paper and the power on test pattern prints properly.

As you monitor a patient, the trace is automatically printed on the trace paper

key/icon	Use this...	Comments
Paper advance	...to fast forward the recorder paper	Press and hold to advance paper at high speed (approximately 30 cm/minute) until you release the button. Any text and graphics being printed during paper advance are lost. Printing resumes when you release the button.
Printing Enable/Disable	...to toggle recorder mode between printing and standby	The indicator LED next to the button is lit when printing is enabled. Printing is enabled by default when you switch the monitor on. It flashes when the paper runs out. This is NOT a power on/off switch. That is located on the rear of the recorder.
Power-on Indicator	...to check that the recorder is ready to print.	This indicator is lit when the monitor is connected to an AC line source, and the mains switch on the rear of the recorder is on.

Working with a Printer

Use a printer that is supported by Philips; other printers may give incomplete printouts, or may not work at all.

Connecting a Printer to the Monitor

Connect the printer to the 25 pin connector on the monitor, marked .

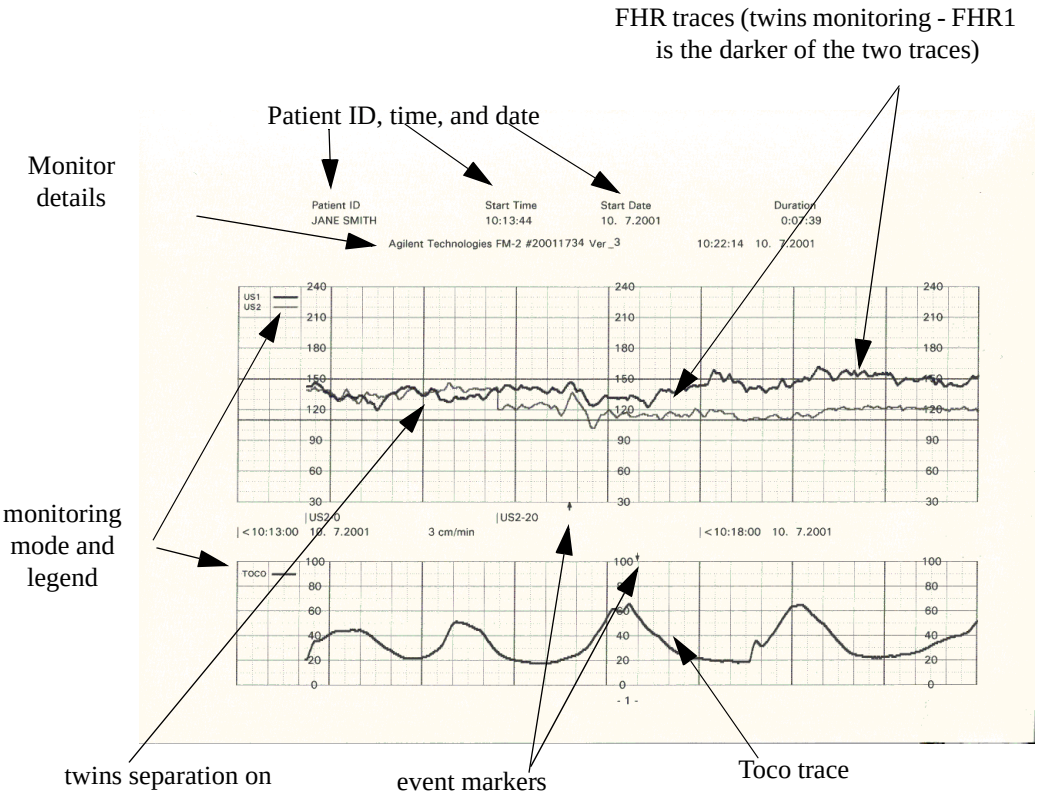
Always follow the manufacturer's instructions for setting up and using your printer.

Using a Printer

You cannot use the printer in realtime mode, only for printing out traces stored in the monitor, or a list of stored fetal traces, showing patient ID. The printout mimics the data from the recorder.

Example Trace

You can print a fetal trace directly during monitoring to the recorder or, later from stored data, to a printer.



A trace may show:

- FHR and Toco traces
- Clinician and patient markers
- Paper speed
- Paper style, US or International (on recorder-trace only)
- Time and date

- Installation or removal of a second ultrasound transducer
- Ultrasound trace separation
- Toco baseline value change
- Toco baseline adjust
- Patient ID
- Monitor software revision
- US1, US2, Toco and legend, depending on whether the transducer is attached or removed.

Each time you press print enable, the following header information appears (recorder only)

- Present time and date
- US1, US2, Toco and legend, if transducer is attached.
- Paper speed
- Paper style - US or International (on recorder-trace only)
- Patient ID

11
Maintenance and Performance Assurance

Preventive Maintenance

The monitor requires a new battery at least every two years, or sooner if the performance does not meet your expectation. After changing the battery, the monitor requires tests as specified in the Service Guide. Only qualified service personnel may change the battery.

There are no user serviceable parts within the monitor, only qualified service personnel are permitted to service or repair the monitor.

Calibration and Adjustment

The monitor, recorder and accessories require no calibration and adjustment.

Performance Assurance

Testing the Monitor and Recorder

When any of the events listed in this table occur, you must perform the appropriate test. The tests are detailed below.

Event	Required Test(s)
Monitor installation	Visual and monitor power-on tests
Monitor reinstallation (after repair)	Visual and monitor power-on tests
Recorder installation	Visual and recorder power-on tests
Power supply replacement	Power-on

Visual Test

Visually inspect the monitor and accessories before use to ensure that the monitor, cables, line cords, transducers and instruments have no visible evidence of damage that may affect patient safety or monitoring performance. Do not use if there is any visible sign of damage.

Monitor Power-on Test

When you press , the monitor plays a power-on tone sequence while performing a power-on test. It displays a startup screen showing revision information about the software release. In less than 15 seconds you will see the monitoring screen. If the monitor fails its self test, it will display an error screen, and monitoring functions will not be available. Remove the monitor from service.

To check the monitor, (and recorder if applicable):

1. Check that the monitor and recorder are properly connected together.
2. Check that the recorder has paper loaded in it.
3. Connect the monitor to the power supply.
4. Turn on the monitor and the recorder.

5. Check that the monitor successfully powers on, and displays the main monitoring screen. If an error occurs, it will display the error screen. Remove the monitor from service if this happens.
6. Check that the recorder is feeding paper, and that the power on test pattern prints properly. Remove the recorder from service if this does not occur.

Recorder Power-on Test

Check that the recorder is feeding paper and the power on test pattern prints properly when you switch it on.

Error Handling

If the monitor detects a problem, it displays an error screen, showing an error reference number and discontinues monitoring. The error number is written into the error log for diagnostic use by qualified service personnel.

If either of the two following error conditions occur, call your representative or Response center for assistance.

- If an operational error occurs that the monitor cannot self-detect, it shuts down. No warning tones or indicator lights occur.
- If a self-detectable error occurs, the monitor displays the error screen, sounds an error tone, and discontinues all monitoring functions. Switch it off and call a qualified service professional.

Checking the Error Log

You can view the error log by selecting Power Status Frame. This displays the Service Menu. Select “View Error Log”. The error log has eight lines and can show up the most recent eight error types. The monitor keeps a count of errors for each error category. You can have many errors of one type and it only occupies one line in the error log. It also shows the date and time of the most recent error. If the limit of eight errors is exceeded, the newest error replaces the oldest.

The A/D values are diagnostic aids for qualified service personnel. They are detailed in the Service Guide.

Error Trouble-shooting

Most errors have no user remedy and require qualified service personnel to interpret them. However if you see:

- **Error 10:** try charging the battery.There is some possibility that charging the battery could fix the situation, though normally a low battery is indicated with the low power warning and forces a monitor shutdown.
- **Error 15:**This is a non-fatal error that occurs from time to time. It is logged in the error log but not normally on the monitoring screen. The only time a user would see this error is by examining the error log. It is not necessary to call a service professional.

Testing Transducers

Testing an Ultrasound Transducer

If the following test fails, contact your Philips Service Engineer or Response Center. Do not use a faulty transducer. Ideally, test with a different ultrasound transducer to determine if it is the original transducer or the monitor that is faulty.

To test an ultrasound transducer:

1. Switch on the monitor.
2. Connect the transducer to the first ultrasound (US) socket.
3. Increase the loudspeaker volume to an audible level.
4. Holding the transducer in one hand, gently tap the transducer surface with your finger. You may find it easier if you use a small amount of gel on transducer surface.
5. You should hear a noise from the loudspeaker.

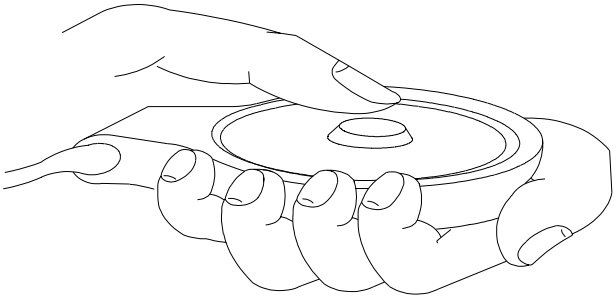
Testing a Toco Transducer

If the following test fails, contact your Philips Service Engineer or Response Center. Do not use a faulty transducer. Ideally, test with a different Toco transducer to determine if it is the original transducer or the monitor that is faulty.

To test a Toco transducer:

1. Switch on the monitor.
2. Connect the transducer to the Toco socket.
3. Zero the transducer, by pressing the Toco Baseline button **0**

4. Gently apply pressure to the button centered on the transducer's face.



5. Check that the value on the display shows this change in pressure.

Disposing of the Equipment

Arrangements for the disposal of your monitor, recorder, battery and transducers at the end of their working life should conform to your country's laws regarding the disposition of equipment containing electrical parts. Adhere to all applicable laws regarding disposal and recycling.

Obtaining Technical Assistance

For technical information and assistance, call your Philips Response Center or your local representative.

Returning System Components

Have all equipment serial numbers available when calling. You will find the unit's serial number on its rear panel.

To pack the unit for return, disconnect all transducers and cables. It is not necessary to return the transducers, event marker, or power cord. Pack the unit into its original shipping carton if available. If not, use a suitable carton with appropriate packing material to protect the unit during shipping.

Supplies and Accessories Reordering Information

These part numbers and descriptions are correct at the time of printing, but may be revised or updated subsequently. To re-order supplies for your monitor contact your local representative or order via the internet at http://shop.medical.philips.com/hsgstore/catalog/supplies_dept.asp

Supply/Accessory	Part Number and Description
Ultrasound Transducer	M1356A Latex free.
Toco Transducer	M1355A Latex free.
Ultrasound transmission gel[a]	40483A: water-soluble, box of 12 x 250ml bottles, shelf life 24 months maximum, 6 months minimum.
	40483B: 5-liter refill container. Shelf life 24 months maximum, 6 months minimum

Supply/Accessory	Part Number and Description
Paper[b] for FM-2 Recorder (M2925A)	M1910A: Z-Fold paper, 150 sheets per pack, 30-240 FHR scale, Orange (USA), No kPA scale, 3cm highlighted lines, Case of 40.
	M1911A: Z-fold paper, 150 sheets per pack, 50-210 FHR scale, Green (International), kPA scale, no highlighted 3 cm lines. Case of 40.
	M1913A:Z-fold paper, 150 sheets per pack, 50-210 FHR scale, Green (International), no kPA scale, highlighted 3 cm lines. Case of 40.
Transducer Belts	M1562A: Elastic, reusable, 1.3m (52”) brown, box of five belts. Contains latex.
	M2208A: Foam, disposable, 1.3m (52”), blue/pink, box of 100 belts (50 blue, 50 pink). Contains latex.
Transducer knob adapters	M1356-43203: Pack of 3.
Belt buttons	M1569A: Pack of 10.
Remote Event Marker	15249A. Latex free.
Canvas Tote Bag	M3919A: Canvas carrying bag with room for monitor and accessories.
GCX Wallmounting	M3904A.
GCX Rollstand	M3909A.

a. Use only the approved gel. Using ultrasound gel that is not approved by Philips may reduce the signal quality and may damage the transducer. This type of damage is not covered by warranty

b. Do not use paper with sprocket holes intended for HP 8040A/8041A fetal monitors as the trace may not be legible and a paper jam may occur. Use only the approved paper.

Response Center Contact Information

Country	Telephone Phone Number	Address
Australia	(Toll free) 1800 033-397	Medical Products Group 347 Burwood Highway Forest Hill VIC 3151 AUSTRALIA
Austria	+43 1 25125 333	Dresdnerstrasse 81-85 1200 Vienna Austria
BENELUX (Belgium & Netherlands)	from Belgium:+32-2-404.9102; from Netherlands:+31-20-547.25.55	Boulevard de la Woluwe 100 1200 Brussels Belgium
Brazil	0-800-553-329	Alameda Araguaia 1142 Alphaville - Barueri CEP 06455-0000 Sao Paulo, BRASIL
China	(Toll free) 86-800-810-0038	HP Building No 2, Dong San Huan Nan Lu Chaoyang District, Beijing PR China
Finland	+358-10-855.2455	Piispankalliontie 17 02200 Espoo - Finland
France	01.64.53.50.00	1 Rue Galvani, F-91745 Massy Cedex, France

Country	Telephone Phone Number	Address
Germany	01805-475000	Geschäftstelle Ratingen, Pempelfurt Str. 1, 40882 Ratingen Germany
Iberia (Spain)	+34 902 30 40 50	Carretera de la Coruna, km 18,300 28230 Las Rozas - Madrid Spain
India	(Toll free) 91 11 6826074	Chandiwala Estate Maa Anand Mai Marg Kalkaji, New Dehli - 110 019 India
International Sales Europe-Middle-East-Africa	+ 41 22 780 6888	International Sales Rue de Veyrot 39 CH - 1217 Meyrin 1 Geneva, Switzerland
Italy	(Toll Free) 8008 25087	Via Gobetti 2/C, 20063 Cernusco sul Naviglio, Milano Italy
Japan	(Toll free) 81 120 381 557	Hachioji Site 9-1, Takakura-Cho Hachioji-Shi Tokyo, 192-8510 Japan
Poland	+48 22 549 1404	Ursynow Business Park U1. Pulawska 303 02-785 Warszaw- Poland

Country	Telephone Phone Number	Address
Russia	+7-95-797-3931	Moscow Riverside Towers Office Kosmodamianskaya naberezhnaya, 52, building 1 Moscow- 113054 Russia
Singapore for SEA	(Toll free) 1-800 4722731	438B Alexandra Road Block B #05-11 Alexandra Technopark Singapore 119968
Sweden	+46-8-50.64.8830	Skalholtsgatan 9 164 97 Kista Sweden
Switzerland	(Toll Free) 0800 80 10 23	39, rue Veyrot 1217 Meyrin / Geneva Switzerland
Taiwan	(Toll free) 080 005616	4F, 337, Fu-Hsing North Road Taipei 105, Taiwan, ROC
United Kingdom	+44 7002 432584	Bridge House, 5 Brants Bridge, Bracknell, Berkshire. RG12 9BG. United Kingdom
USA	(Toll free) 800-548-8833 for USA customers (Toll free) 800-323-2280 for Canadian customers (Toll free) 800-533-6908 for Puerto Rican customers (Toll free) 800-477-7333 for alliance customers	Philips Medical Systems, CMS 3750 Brookside Parkway Alpharetta, GA 30022

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Troubleshooting

Printer and Recorder

Problem	Possible Causes	Solutions
Light or no trace.	Wrong paper or dirty printhead.	Use recommended paper or clean printhead.
		Check that printer cartridge is not empty and change if necessary.
End of paper noted when pack not finished	Bad paper feed or wrong paper.	Check paper feed and use recommended paper.
Missing text or graphics	You pressed print advance during printing.	Don’t advance paper until the record has finished printing.
The last 20cm of recorder paper are blank.	This is not a fault, this is normal behaviour from this recorder. No trace data is lost.	
Incomplete or no printout	This make of printer is not supported for use with the monitor.	Use recommended printer.
Grid and numeric scales are improperly aligned		

Toco Monitoring

Problem	Possible Causes	Solutions
-?- appears in Toco transducer display	Monitor unable to detect transducer.	Connect Toco transducer (M1355A) to this channel. Ensure it is securely inserted.
Quality of the trace deteriorates or the Toco baseline varies.	The belt is incorrectly fastened and is too slack or too tight or the belt has lost its elasticity.	The belt must be tight enough to ensure good contact between the patient's skin and the entire surface of the transducer without causing discomfort. Ensure your are using the correct Philips belt. Adjust it as necessary.
	Maternal movement.	Relax the patient.
	Fetal movement.	None.
	Maternal respiration superimposed on trace.	Check belt is neither too tight nor too loose.
Toco sensitivity is too high (above 100 units).	Physical transmission of pressure from the uterus to the sensor is much higher than the average value.	Ensure a good contact between the patient's skin and the entire surface of the transducer. Reposition transducer if necessary.
		Lower the Toco baseline to 5 (at the Toco menu).
Periodic low alarm tone but nothing wrong with fetus.	Monitor is sounding the low battery power warning.	Check the battery fuel gauge. Recharge from an AC supply, using the power supply.
If you suspect the signal from the transducer.		Carry out the transducer test described on see "Testing a Toco Transducer" on page 86.

FHR Monitoring

Problem	Possible Causes	Solutions
-?- in FHR numeric display	Monitor unable to detect transducer.	Connect US transducer (M1356A) to this channel. Ensure it is securely inserted.
--- in FHR numeric display	FHR higher or lower than measurement range.	Measure FHR manually.
	Signal Loss Alert.	Relocate transducer until signal is recovered.
Erratic trace or Erratic display.	Obese patient.	None.
	Fetal arrhythmia.	None.
	Transducer wrongly positioned.	Reposition transducer until FHR value displays on the screen.
	Belt loose.	Tighten belt.
	Too much gel - the transducer slides around.	Remove excess.
	Very active fetus.	None.
	Maternal movement.	Relax the patient.
	Insufficient gel.	Use recommended amount.
Questionable FHR.	Recording MHR by mistake.	Check mother's pulse; and reposition transducer until FHR displays on the screen.
	Recording periodic signals when the transducer is not applied to patient.	Disconnect unused transducer.
Periodic low alarm tone but nothing wrong with fetus.	Monitor is sounding the low battery power warning.	Check the battery fuel gauge. Recharge from an AC supply, using the power supply.
If you suspect the signal from the transducer.		Carry out the transducer test described in "Testing Transducers" on page 86.

Printing and Transmitting Records

Behavior	Reason	Possible Remedy
The monitor dialed a number but did not make a connection to the remote device.	Remote modem did not answer.	Check that the remote modem is connected and turned on.
	Dialed number was busy.	Wait for the current call to finish. Check the number by calling using the telephone.
	Remote modem connected with PC running FM-2 viewer but the data transfer timed out before any data was transferred.	Check that the FM-2 receiver software is running and that the modem is selected to receive data on the remote computer.
No dial tone or dialing was heard when the monitor dialed the remote computer.	The modem may be set to disable the speaker.	Examine the modem documentation and initialization strings to enable the modem speaker during dialing.
	Faulty modem or faulty connection to the modem.	Watch the modem lights for activity during dialing. If the modem lights show no activity, then check the cable connections between the monitor and the modem. Check the modem operation.
	Modem not connected to the phone jack.	Check the modem connection to the phone jack. Check that you are using an analog line for the modem.
File transfers were cut off or terminated before completion.	Disconnect from modem or phone line at the modem or remote computer.	Check the phone line connections between the modem and phone jack on the local and remote computers.
	Poor phone connection.	Check the phone connection. Poor or noisy phone lines will cause the transfer of data to be terminated.
	Insufficient remote processor at PC running FM-2 viewer.	Check that the computer running the FM-2 viewer meets the minimum system requirements.
	Extension was taken off the hook	Check that another extension on the same phone line is not in use.
	Telephone has “incoming call” notification (ie an audible beep when phone is in use and new call comes in)	This feature can terminate a transfer if a new call comes in during transfer. If possible, disable this feature before starting transfers.

Behavior	Reason	Possible Remedy
The time/date displayed by the monitor is not the same as the time/date shown on the trace or by OB **TraceVue.**	You changed the monitor time/date during a trace recording session. The time/date at which the recording commenced is stored as part of the fetal trace record.	Time and date changes are not shown until a new monitoring session commences. Start a new monitoring session after changing the time or date on FM-2. Don't change it during a monitoring session.

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Specifications

FM-2 Monitor

Monitor Specifications		
Dimensions and Weight without transducers	Height	6.0 inches (15.24 cm)
	Width	10.4 inches (26.4 cm)
	Weight	5 lb (2.27 kg)
	Depth	5.4 inches (13.7 cm)
Safety	Complies with EN60601-1, EN60601-1-1, EN60601-2, EN60601-2-37, IEC 1157, IEC 60601-1, UL2601-1, CAN/CSA C22.2#601.1-M90	
	Class II Equipment, double insulated	
	Continuous Operation	
	Type BF applied parts	
Power Internal	Battery type	Lead acid, rechargeable
	Battery Operation	2-hours operation fully charged at 10°C
		14 hours to full recharge during monitoring
		8 hours to full recharge when monitor is off
Power External	AC-powered power supply, two models: 100-120V~, 50-60 Hz, 0.15A or 220-240V~, 50-60 Hz, 0.08A	
Power Dissipation	Battery powered	6 watts, maximum
	AC-powered	10 watts, maximum
Environmental	Operating Temperature	10°C to 45° C (50°F to 110° F)
	Storage Temperature	-20°C to 60°C (-29°F to 175°F)
	Relative Humidity	20% to 90% noncondensing
	Altitude	0-3048m (0-10,000 ft)

Monitor Specifications		
Display	Backlight	Cold cathode fluorescent
	Active area	3.78” x 2.83 (320 x 240 dots)
	Resolution	approx 85 dots/inch (DPI)
	Contrast	10:1
Doppler Ultrasound and FHR Monitoring	Ultrasonic Frequency	1024 KHz +/- 0.5%
	Pulse Duration	95.76 µseconds
	Pulse Repetition Frequency	3.2 KHz
	BPM Range	USA Paper: 30-240 BPM International Paper: 50-210 BPM
	Accuracy	±1% ±1BPM
	Leakage current	≤10 µ A @ 264 VAC applied to transducer
	Isolation	>4 kV RMS, Type BF applied part
Tocotonometer Uterine Activity (Toco) Monitoring	Toco Range	0-100 relative units
	Resolution	1 Count
	Accuracy	±1% ±1 relative unit
	Leakage	≤10 µ A @ 264 VAC applied to transducer
	Isolation	>4 kV RMS, Type BF applied part

Ultrasound Transducer

Doppler Ultrasound FHR Monitoring	
$I_{(sata)}$ at the transducer face	2.97 mW/cm^2 +27.9%/-23.7%
Entrance Beam Dimensions	5.5 cm^2, circular
Ultrasonic Power	16.36 mW +27.9% / -23.7%

Recorder

Dimensions and Weight without transducers	Height	4.9 inches (12.5 cm)
	Width	9.2 inches (23.4 cm)
	Weight	7lb 13oz (3.54 kg)
	Depth	10.3 inches (26.2 cm)
Safety	Complies with EN60601-1, EN60601-1-1, EN60601-2	
	Class I Equipment. Requires 3-prong outlet with protective earth	
	Continuous Operation	
Power	100-120V~, 50-60 Hz, 0.15A 220-240V~, 50-60 Hz, 0.6A Power consumption: 20 watts maximum at normal supply voltage	
Environmental	Operating Temperature	10^{o}C to 45^{o} C (50^{o}F to 110^{o} F)
	Storage Temperature	-20^{o}C to 60^{o}C (-29^{o}F to 175^{o}F)
	Relative Humidity	20% to 90% non-condensing
	Altitude	0-3048m (0-10,000 ft)

Paper

Paper Specifications	
Style	Z-fold. USA (M1910A) or International (M1911A)
Pack Size	150 pages
End-of-Pack	Mark along paper edge, stop sign on last page
Loading	Front door, drop-in, self aligning
Paper detectors	Paper out
	Recorder Loading Door Open
Paper speeds	**Normal**: 1,2, and 3 cm/min ±1%
	Batch: average 25 cm/min
Paper tracking accuracy	±1% (exclusive of paper accuracy)

14
Training Evaluation

Institution:			
Student name:	**Reviewer name:**		
Date:	**Date completed**		
Skill:	**Performed return demonstration**	**Needs more work**	**N/A**
Monitor Setup			
Can identify fetal monitor components			
Can turn monitor on and off			
Can set the language			
Can set the paper speed and style			
Can set the date and time			
Can adjust the Toco baseline value			
Can adjust the screen contrast			
Can identify the power source in use			
Can describe excepted behavior for low battery power			
Monitoring			
Can identify the default patient ID number and the structure of the ID number			
Can change the default patient ID number			
Can connect the US1 and US2 transducers to the monitor			

Institution:			
Student name:	**Reviewer name:**		
Date:	**Date completed**		
Skill:	**Performed return demonstration**	**Needs more work**	**N/A**
Can set the trace separation to 20 bpm			
Can adjust the FHR upper and lower alarm limits and alarm delay time			
Can adjust the FHR signal loss alarm delay			
Can disable the FHR alarms and identify the status indicator			
Can acknowledge an alarm when one occurs			
Can select FHR1 or FHR2 for the speaker and adjust the volume			
Can apply ultrasound and Toco transducers in good position and obtain a value			
Can describe use of FHR grid lines in determining FHR acceleration.			
Can adjust the FHR grid lines to be 15 beats apart			
Can mark an event with the clinician marker and the patient marker			
Can scroll through current and stored trends			
Can distinguish between different stored trends			

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